GARMIN

G1000® Integrated Flight Deck

Pilot's Guide

Beechcraft A36/G36

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This manual reflects the operation of System Software version 0464.05 or later. Some differences in operation may be observed when comparing the information in this manual to earlier or later software versions.

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October 2006 Printed in the U.S.A

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WARNING: *Navigation and terrain separation must NOT be predicated upon the use of the terrain function. The G1000 Terrain Proximity feature is NOT intended to be used as a primary reference for terrain avoidance and does not relieve the pilot from the responsibility of being aware of surroundings during flight. The Terrain Proximity feature is only to be used as an aid for terrain avoidance and is not certified for use in applications requiring a certified terrain awareness system. Terrain data is obtained from third party sources. Garmin is not able to independently verify the accuracy of the terrain data.*

WARNING: *The displayed minimum safe altitudes (MSAs) are only advisory in nature and should not be relied upon as the sole source of obstacle and terrain avoidance information. Always refer to current aeronautical charts for appropriate minimum clearance altitudes.*

WARNING: *The Garmin G1000, as installed in the Beechcraft A36/G36, has a very high degree of functional integrity. However, the pilot must recognize that providing monitoring and/or self-test capability for all conceivable system failures is not practical. Although unlikely, it may be possible for erroneous operation to occur without a fault indication shown by the G1000. It is thus the responsibility of the pilot to detect such an occurrence by means of cross-checking with all redundant or correlated information available in the cockpit.*

WARNING: *For safety reasons, G1000 operational procedures must be learned on the ground.*

WARNING: *The altitude calculated by G1000 GPS receivers is geometric height above Mean Sea Level and could vary significantly from the altitude displayed by pressure altimeters, such as the GDC 74A Air Data Computer, or other altimeters in aircraft. GPS altitude should never be used for vertical navigation. Always use pressure altitude displayed by the G1000 PFD or other pressure altimeters in aircraft.*

WARNING: *The Jeppesen database used in the G1000 system must be updated regularly in order to ensure that its information remains current. Updates are released every 28 days. A database information packet is included in the G1000 package. Pilots using an outdated database do so entirely at their own risk.*

WARNING: *The basemap (land and water data) must not be used for navigation, but rather only for non-navigational situational awareness. Any basemap indication should be compared with other navigation sources.*

CAUTION: *The illustrations in this guide are only examples. Never use the G1000 to attempt to penetrate a thunderstorm. Both the FAA Advisory Circular, Subject: Thunderstorms, and the Airman's Information Manual (AIM) recommend avoiding "by at least 20 miles any thunderstorm identified as severe or giving an intense radar echo."*

CAUTION: *The United States government operates the Global Positioning System and is solely responsible for its accuracy and maintenance. The GPS system is subject to changes which could affect the accuracy and performance of all GPS equipment. Portions of the Garmin G1000 utilize GPS as a precision electronic NAVigation AID (NAVAID). Therefore, as with all NAVAIDs, information presented by the G1000 can be misused or misinterpreted and, therefore, become unsafe.*

CAUTION: *To reduce the risk of unsafe operation, carefully review and understand all aspects of the G1000 Pilot's Guide documentation. Thoroughly practice basic operation prior to actual use. During flight operations, carefully compare indications from the G1000 to all available navigation sources, including the information from other NAVAIDs, visual sightings, charts, etc. For safety purposes, always resolve any discrepancies before continuing navigation.*

CAUTION: *The Garmin G1000 does not contain any user-serviceable parts. Repairs should only be made by an authorized Garmin service center. Unauthorized repairs or modifications could void both the warranty and the pilot's authority to operate this device under FAA/FCC regulations.*

CAUTION: *The GDU 1040 PFD and MFD displays use a lens coated with a special anti-reflective coating that is very sensitive to skin oils, waxes, and abrasive cleaners. CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING. It is very important to clean the lens using a clean, lint-free cloth and an eyeglass lens cleaner that is specified as safe for anti-reflective coatings.*

NOTE: *All visual depictions contained within this document, including screen images of the G1000 panel and displays, are subject to change and may not reflect the most current G1000 system. Depictions of equipment may differ slightly from the actual equipment.*

NOTE: *This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

NOTE: *There are several atmospheric phenomena in addition to nearby thunderstorms that can cause isolated discharge points in the strike display mode. However, clusters of two or more discharge points in the strike display mode do indicate thunderstorm activity if these points reappear after the screen has been cleared. Avoid the clusters to avoid the thunderstorms. In the cell display mode, even a single discharge point may represent thunderstorm activity and should therefore be avoided.*

Record of Revisions				
Part Number	**Revision**	**Date**	**Page Range**	**Description**
190-00595-00	A	10/16/06	ALL	Initial release

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SECTION 1 SYSTEM OVERVIEW

1.1 SYSTEM DESCRIPTION

NOTE: *Refer to Section 7 for a description of the GFC 700 AFCS.*

The G1000 is an integrated flight deck system that presents flight instrumentation, position, navigation, communication, and identification information to the pilot using flat-panel color displays. The system consists of the following Line Replaceable Units (LRUs):

- **GDU 1040** Primary Flight Display (PFD)
- **GDU 1042** Multi Function Display (MFD)
- **GMA 1347** Audio Panel with Integrated Marker Beacon Receiver
- **GIA 63** Integrated Avionics Units (IAU)
- **GDC 74** Air Data Computer (ADC)
- **GEA 71** Engine/Airframe Unit
- **GTX 33** Mode S Transponder
- **GRS 77** Attitude and Heading Reference System (AHRS)
- **GMU 44** Magnetometer
- **GDL 69/69A** Data Link Receiver
- **GSA 81** AFCS Servos
- **GSM 85** Servo Mounts

Figure 1-1 shows interactions between the LRUs. Additional/optional equipment are shown in Figure 1-2.

The Beechcraft A36/G36 is equipped with a GFC 700 Automated Flight Control System (AFCS), providing flight director (FD), autopilot (AP), and manual electric trim (MET) operation.

1.2 LINE REPLACEABLE UNITS

- **GDU 1040/1042** (2) – A GDU 1040 is configured as the Primary Flight Display (PFD) and a GDU 1040 or 1042 (for airframes equipped with the GFC 700) as a Multi Function Display (MFD). Both displays feature 10.4-inch LCD screens with 1024 x 768 resolution. The displays communicate with each other through a High-speed Data Bus (HSDB) Ethernet connection. Each display is also paired with an Ethernet connection to an IAU.

- **GMA 1347** – The Audio Panel integrates navigation/communication radio (NAV/COM) digital audio, intercom, and marker beacon controls, and is installed between the displays. This unit also provides manual control of display Reversionary Mode (red **DISPLAY BACKUP** button; see Section 1.5, System Operation) and communicates with both IAUs using an RS-232 digital interface.

- **GIA 63** (2) – The Integrated Avionics Units (IAU) function as the main communications hub, linking all LRUs with the PFD. Each IAU contains very high frequency (VHF) communication/navigation/glideslope (COM/NAV/GS) receivers and system integration microprocessors and is paired with the on-side display via an HSDB connection. The IAUs are not paired together and do not communicate with each other directly.

GDC 74 – The Air Data Computer (ADC) processes data from the pitot/static system and outside air temperature (OAT) sensor. The ADC provides pressure altitude, airspeed, vertical speed, and OAT information to the G1000 System, and it communicates with the primary IAU, displays, and AHRS using an ARINC 429 digital interface.

- **GEA 71 –** The Engine Airframe Unit receives and processes signals from the engine and airframe sensors. This unit communicates with both IAUs using an RS-485 digital interface.

- **GTX 33 –** The solid-state Transponder provides Modes A, C, and S capability and communicates with both IAUs through an RS-232 digital interface.

- **GRS 77** (2) – The Attitude and Heading Reference System (AHRS) provides aircraft attitude and heading information via ARINC 429 to both the PFD and the primary IAU. The AHRS contains advanced sensors (including accelerometers and rate sensors) and interfaces with the Magnetometer to obtain magnetic field information, with the ADC to obtain air data, and with both IAUs to obtain GPS information. AHRS operation is discussed in Section 1.5, System Operation.

- **GMU 44 –** The Magnetometer measures local magnetic field and sends data to the AHRS for processing to determine aircraft magnetic heading. This unit receives power directly from the AHRS and communicates with it via an RS-485 digital interface.

- **GDL 69A –** The Data Link Satellite Radio Receiver provides real-time weather information to MFD maps and the PFD Inset Map, as well as digital audio entertainment. The Data Link Receiver communicates with the MFD via an HSDB connection. A subscription to XM Satellite Radio Service is required to enable Data Link Receiver capability.

- **GSA 81** and **GSM 85 –** The GSA 81 servos are used for automatic control of pitch, pitch trim, and roll. These units interface with each IAU.

  The GSM 85 servo mounts are responsible for transferring the output torque of the servo actuators to the mechanical flight-control surface linkages.

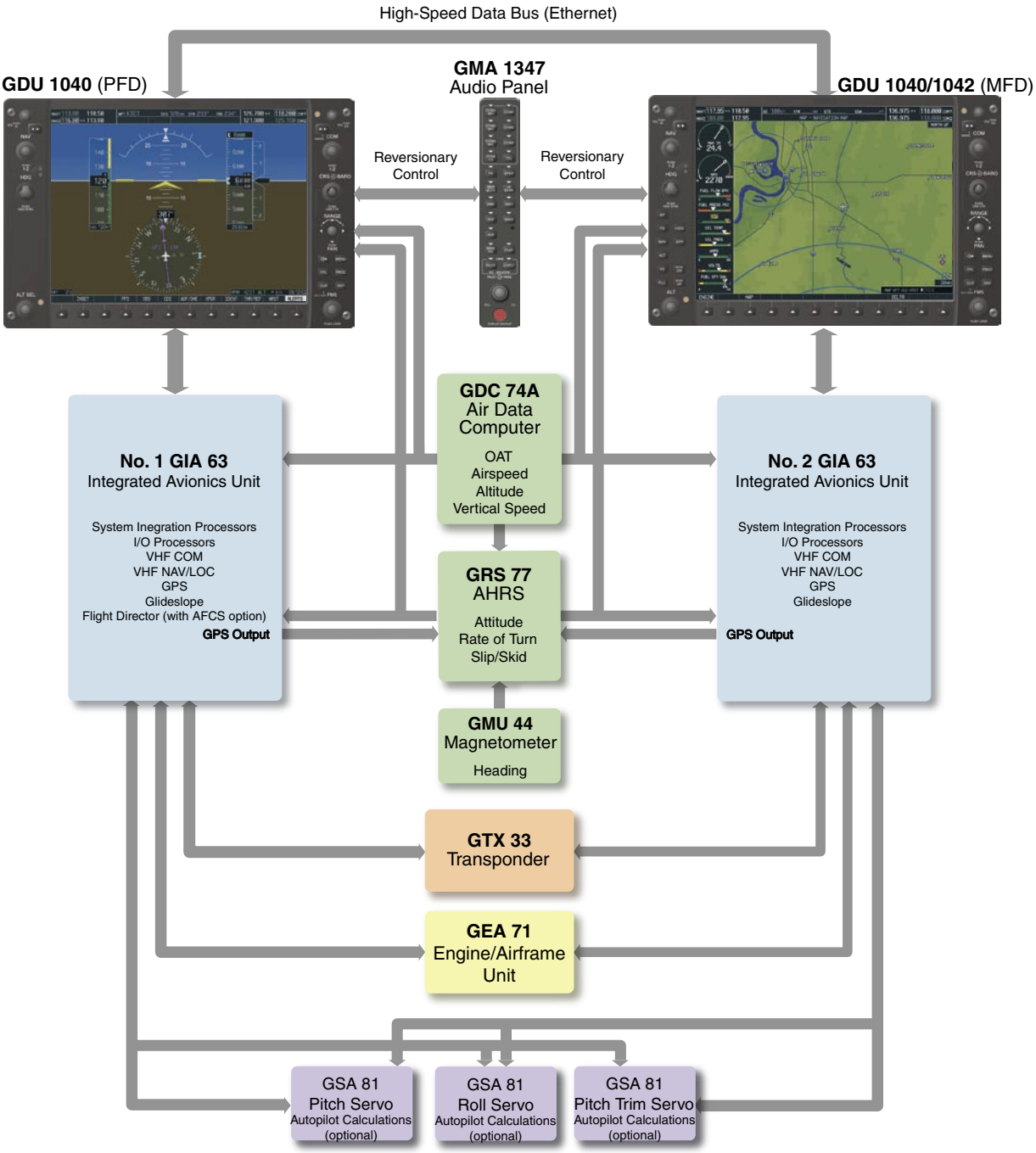


Figure 1-1 Basic G1000 System Block Diagram

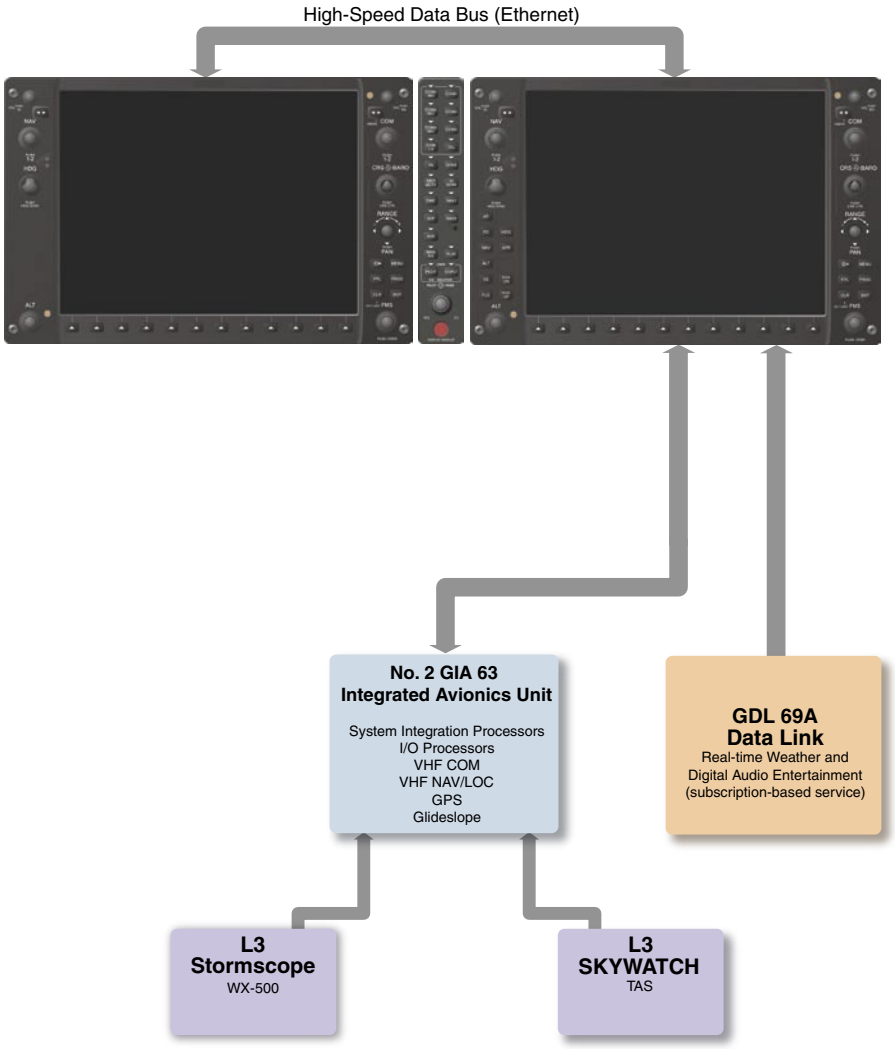


Figure 1-2 G1000 System Block Diagram With Options

NOTE: *For information on additional equipment shown in Figure 1-2, consult the applicable optional interface user's guide. This document assumes that the reader is already familiar with the operation of this additional equipment.*

1.3 SECURE DIGITAL (SD) CARDS

NOTE: *Ensure the G1000 System is powered off before inserting an SD card.*

NOTE: *Refer to Appendix B for instructions on updating the aviation database.*

The PFD and MFD data card slots use Secure Digital (SD) cards and are located on the upper right side of the display bezels. Each display bezel is equipped with two SD card slots. SD cards are used for aviation database and system software updates as well as terrain database storage.

Installing an SD card:

1) Insert the SD card in the SD card slot (the front of the card should be flush with the face of the display bezel).

2) To eject the card, gently press on the SD card to release the spring latch.

Figure 1-3 Display Bezel SD Card Slots

1.4 SYSTEM POWER-UP

NOTE: *See the Aircraft Flight Manual (AFM) for specific procedures concerning avionics power application and emergency power supply operation.*

NOTE: *Refer to Appendix A for system-specific annunciations and alerts.*

The G1000 System is integrated with the aircraft electrical system and receives power directly from electrical busses. The PFD, MFD, and supporting sub-systems include both power-on and continuous built-in test features that exercise the processor, RAM, ROM, external inputs, and outputs to provide safe operation.

During system initialization, test annunciations are displayed, as shown in Figure 1-4. All system annunciations should disappear typically within the first minute of power-up. Upon power-up, key annunciator lights also become momentarily illuminated on the Audio Panel and the display bezels.

On the PFD, the AHRS begins to initialize and displays "AHRS ALIGN: Keep Wings Level". The AHRS should display valid attitude and heading fields typically within the first minute of power-up. The AHRS can align itself both while taxiing and during level flight.

When the MFD powers up, the splash screen (Figure 1-5) displays the following information:

- System version
- Copyright
- Land database name and version
- Obstacle database name and version
- Terrain database name and version
- Aviation database name, version, and effective dates

Current database information includes valid operating dates, cycle number, and database type. When this information has been reviewed for currency (to ensure that no databases have expired), the pilot is prompted to continue.

Pressing the **ENT** Key (or right-most softkey) acknowledges this information, and the Navigation Map Page is displayed upon pressing the key a second time. When the system has acquired a sufficient number of satellites to determine a position, the aircraft's current position is shown on the Navigation Map Page.

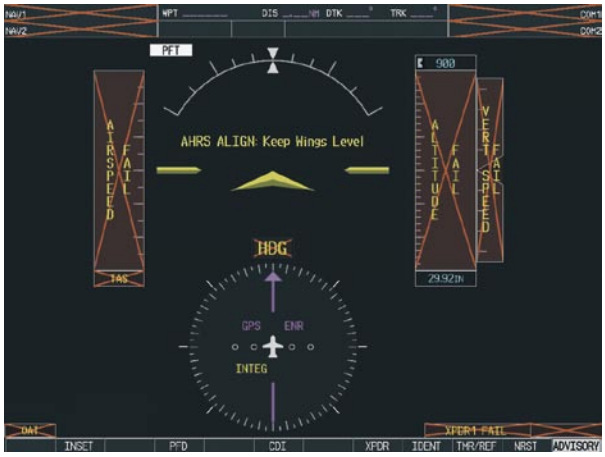


Figure 1-4 PFD Initialization

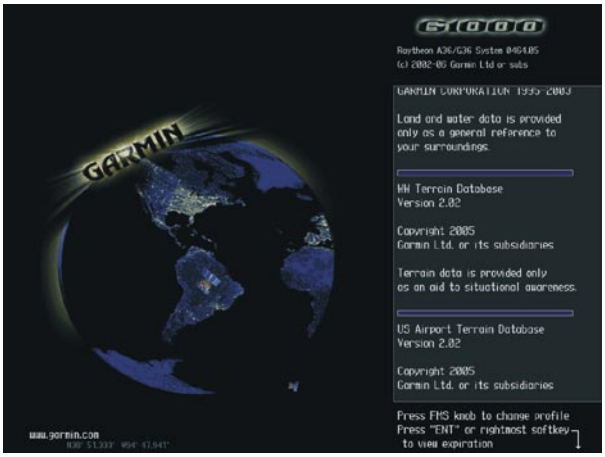

G1000
GARMIN
Land and water data is provided only as a general reference to your surroundings.
Copyright 2005 Garmin Ltd. or its subsidiaries
Terrain data is provided only as an aid to situational awareness.
US Airport Terrain Database Version 2.02
Copyright 2005 Garmin Ltd. or its subsidiaries
Press FMS knob to change profile
Press "ENT" or rightmost softkey to view expiration

Figure 1-5 MFD Power-Up Splash Screen

1.5 SYSTEM OPERATION

The displays are connected together via a single Ethernet bus for high-speed communication. As shown in Figure 1-1, each IAU is connected to the on-side display. Normal and reversionary G1000 display operation, as well as the various AHRS modes and G1000 System Annunciations are discussed here.

NORMAL DISPLAY OPERATION

In normal operating mode, the PFD presents graphical flight instrumentation (attitude, heading, airspeed, altitude, vertical speed), replacing the traditional flight instrument cluster (see the Flight Instruments Section for more information). The MFD normally displays a full-color moving map with navigation information (see the GPS Navigation Section), while the left portion of the MFD is dedicated to the Engine Indication System (EIS; see the EIS Section). Both displays offer control for COM and NAV frequency selection.

Figure 1-6 G1000 Normal Operation

REVERSIONARY DISPLAY OPERATION

NOTE: *The G1000 System alerts the pilot when backup paths are utilized by the LRUs. Refer to Appendix A for further information regarding system-specific alerts.*

NOTE: *In normal operating mode, backlighting can only be adjusted from the PFD. In Reversionary Mode, it can be adjusted from the remaining display.*

In the event of a display failure, the G1000 System automatically switches to reversionary (backup) mode. In Reversionary Mode, all important flight information is presented on the remaining display in the same format as in normal operating mode.

If a display fails, the appropriate IAU-display Ethernet interface is cut off. Thus, the IAU can no longer communicate with the remaining display (refer to Figure 1-1), and the NAV and COM functions provided to the failed display by the IAU are flagged as invalid on the remaining display. The system reverts to backup paths for the AHRS, ADC, Engine/Airframe Unit, and Transponder, as required. The change to backup paths is completely automated for all LRUs and no pilot action is required.

If the system fails to detect a display problem, Reversionary Mode may be manually activated by pressing the Audio Panel's red **DISPLAY BACKUP** button. Pressing this button again deactivates Reversionary Mode.

NAV1 and COM1 (provided by the failed PFD) are flagged as invalid.
Pressing the DISPLAY BACKUP Button also activates/deactivates Reversionary Mode.

Figure 1-7 G1000 Reversionary Mode (Failed PFD)

G1000 SYSTEM ANNUNCIATIONS

When an LRU or an LRU function fails, a large red 'X' is typically displayed over the instrument experiencing failed data (Figure 1-8 displays all possible flags and responsible LRUs). For a detailed description of all annunciations and alerts, refer to Appendix A. Refer to the Aircraft Flight Manual (AFM) for additional information regarding pilot responses to these annunciations.

Upon G1000 power-up, certain instruments remain invalid as equipment begins to initialize. All instruments should be operational within one minute of power-up. If any instrument remains flagged, the G1000 should be serviced by a Garmin-authorized repair facility.

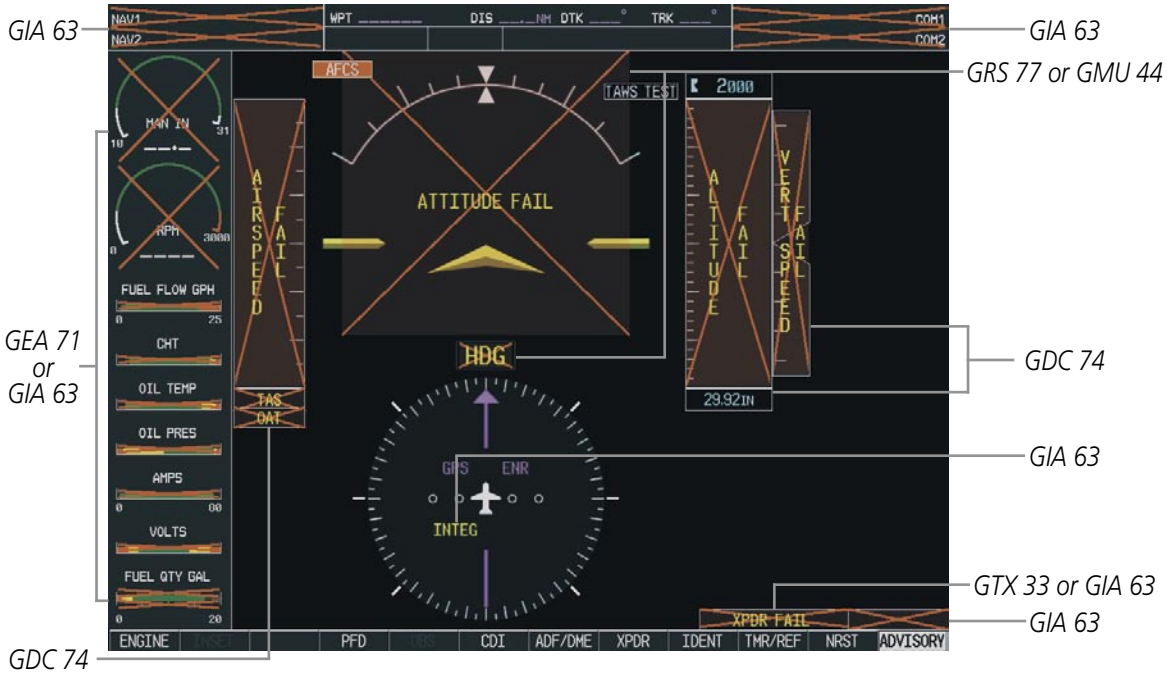


Figure 1-8 G1000 System Failure Annunciations

AHRS OPERATION

NOTE: *Aggressive maneuvering while AHRS is not operating normally may degrade AHRS accuracy.*

The Attitude and Heading Reference System (AHRS) performs attitude, heading, and vertical acceleration calculations for the G1000 System, utilizing GPS, magnetometer, and air data in addition to information from its internal sensors. Attitude and heading information are updated on the PFD while the AHRS receives appropriate combinations of information from the external sensor inputs.

Loss of GPS, magnetometer, or air data inputs is communicated to the pilot by message advisory alerts (refer to Appendix A for specific AHRS alert information). Any failure of the internal AHRS inertial sensors results in loss of attitude and heading information (indicated by red 'X' flags over the corresponding flight instruments).

GPS INPUT FAILURE

Two GPS inputs are provided to the AHRS. If GPS information from one of the inputs fails, the AHRS uses the remaining GPS input and an alert message is issued to inform the pilot. If both GPS inputs fail, the AHRS can continue to provide attitude and heading information to the PFD as long as magnetometer and airspeed data are available and valid.

MAGNETOMETER FAILURE

If the magnetometer input fails, the AHRS continues to output valid attitude information; however, the heading output on the PFD is flagged as invalid with a red 'X'.

AIR DATA INPUT FAILURE

Failure of the air data input has no effect on the AHRS output while AHRS is receiving valid GPS information. Invalid/unavailable airspeed data in addition to GPS failure results in loss of all attitude and heading information.

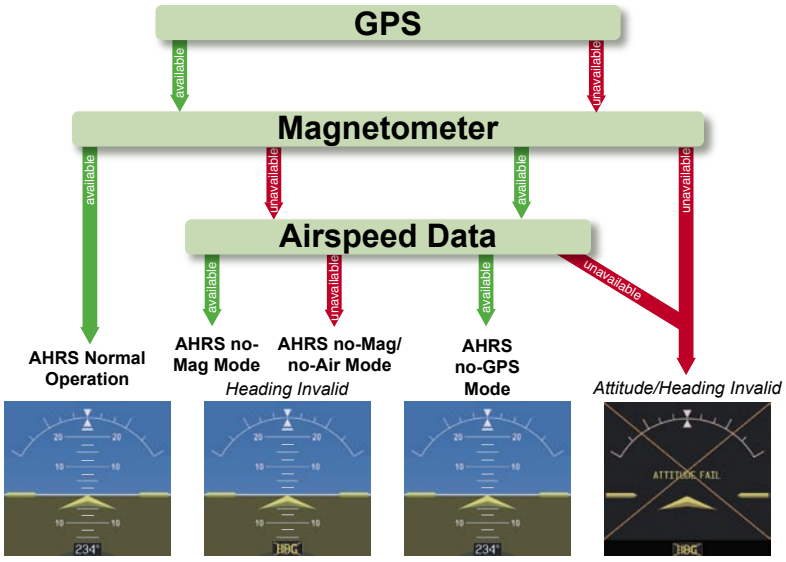


Figure 1-9 AHRS Operation

1.6 G1000 CONTROLS

The G1000 controls have been designed to simplify operation of the system and minimize workload and the time required to access sophisticated functionality. Controls are located on the PFD and MFD bezels and Audio Panel. PFD and MFD controls and softkeys are discussed in this section. See the Audio Panel and CNS Section for more information about Audio Panel and NAV/COM controls. AFCS controls (on the bezel of the MFD) are described in the AFCS section.

PFD/MFD CONTROLS

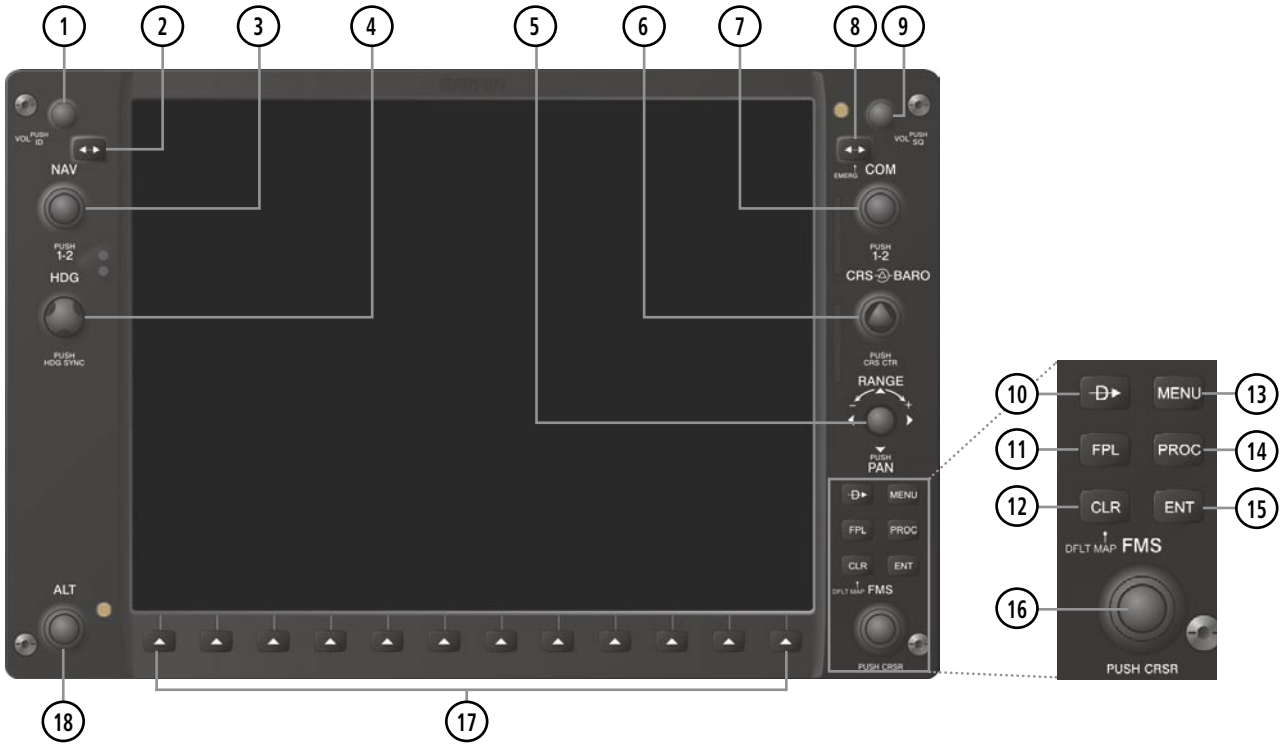


Figure 1-10 PFD/MFD Controls

(1) **NAV VOL/ID Knob**	Turn to control NAV audio volume (shown in the NAV Frequency Box as a percentage)
	Press to toggle Morse code identifier audio on/off
(2) **NAV Frequency Transfer Key**	Transfers the standby and active NAV frequencies
(3) **NAV Knob**	Turn to tune NAV receiver standby frequencies (large knob for MHz; small for kHz)
	Press to toggle light blue tuning box between NAV1 and NAV2
(4) **Heading Knob**	Turn to manually select a heading
	Press to display a digital heading momentarily to the left of the Horizontal Situation Indicator (HSI) and synchronize the Selected Heading to the and current heading
(5) **Joystick**	Turn to change map range
	Press to activate Map Pointer and move in desired direction to pan map

(6) **CRS/BARO Knob**	Turn large knob for altimeter barometric pressure setting
	Turn small knob to adjust course (only when HSI is in VOR or OBS Mode)
	Press to re-center the CDI and return course pointer directly TO bearing of active waypoint/station
(7) **COM Knob**	Turn to tune COM transceiver standby frequencies (large knob for MHz; small for kHz)
	Press to toggle light blue tuning box between COM1 and COM2
	The selected COM (green) is controlled with the **COM MIC** Key (Audio Panel).
(8) **COM Frequency Transfer Key (EMERG)**	Transfers the standby and active COM frequencies
	Press and hold two seconds to tune the emergency frequency (121.5 MHz) automatically into the active frequency field
(9) **COM VOL/SQ Knob**	Turn to control COM audio volume level (shown as a percentage in the COM Frequency Box)
	Press to turn the COM automatic squelch on/off
(10) **Direct-to Key (D▸)**	Activates the direct-to function and allows the user to enter a destination waypoint and establish a direct course to the selected destination (specified by identifier, chosen from the active route)
(11) **FPL Key**	Displays flight plan information
(12) **CLR Key (DFLT MAP)**	Erases information, cancels entries, or removes menus
	Press and hold to display the MFD Navigation Map Page (MFD only).
(13) **MENU Key**	Displays a context-sensitive list of options for accessing additional features or making setting changes
(14) **PROC Key**	Gives access to IFR departure procedures (DPs), arrival procedures (STARs), and approach procedures (IAPs) for a flight plan or selected airport
(15) **ENT Key**	Validates/confirms selection or data entry
(16) **FMS Knob (Flight Management System Knob)**	Press to turn the selection cursor on/off
	Data Entry: With cursor on, turn to enter data in the highlighted field (large knob moves cursor location; small knob selects character for highlighted cursor location)
	Scrolling: When a list of information is too long for the window/box, a scroll bar appears, indicating more items to view. With cursor on, turn large knob to scroll through the list.
	Page Selection: Turn knob on MFD to select the page to view (large knob selects a page group; small knob selects a specific page from the group)
(17) **Softkey Selection Keys**	Press to select softkey shown above the bezel key on the PFD/MFD display
(18) **ALT Knob**	Sets the Selected Altitude, shown above the Altimeter (the large knob selects the thousands, the small knob selects the hundreds)

The **NAV**, **CRS/BARO**, **COM**, **FMS**, and **ALT** knobs are concentric dual knobs, each having small (inner) and large (outer) control portion. When a portion of the knob is not specified in the text, either may be used.

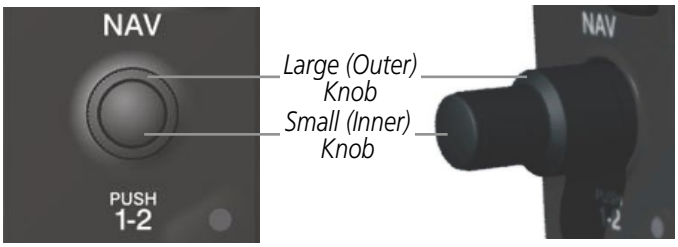


Figure 1-11 Dual Concentric Knob

SOFTKEY FUNCTION

The softkeys are located along the bottoms of the displays. The softkeys shown depend on the softkey level or page being displayed. The bezel keys below the softkeys can be used to select the appropriate softkey. When a softkey is selected, its color changes to black text on gray background and remains this way until it is turned off, at which time it reverts to white text on black background.

In the following descriptions, top level softkeys are denoted with bullets.

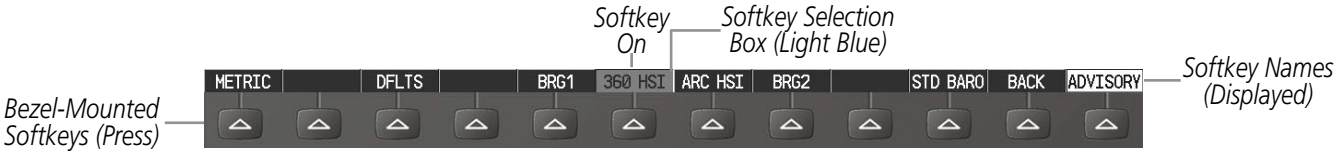


Figure 1-12 Softkeys (Second-Level PFD Configuration)

PFD SOFTKEYS

The **CDI**, **IDENT**, **TMR/REF**, **NRST**, and **ALERTS** softkeys undergo a momentary change to black text on gray background and automatically switch back to white text on black background when selected.

The PFD softkeys provide control over flight management functions, including GPS, NAV, terrain, traffic, and lightning (optional). Each softkey sublevel has a **BACK** Softkey which can be selected to return to the previous level. The **ALERTS** Softkey is visible at all softkey levels (label changes if messages are issued).

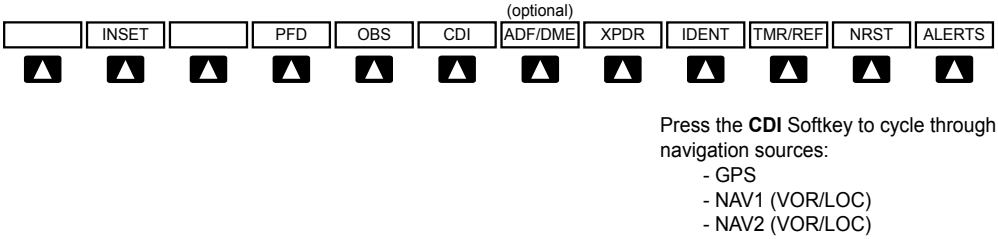


Figure 1-13 Top-level PFD Softkeys

- **INSET** Displays Inset Map in PFD lower left corner
  - **OFF** Removes Inset Map
  - **DCLTR (3)** Selects desired amount of map detail; cycles through declutter levels:
    - DCLTR (No Declutter): All map features visible
    - DCLTR-1: Removes land data
    - DCLTR-2: Removes land and SUA data
    - DCLTR-3: Removes everything except active flight plan
  - **TRAFFIC** Displays/removes traffic information on Inset Map
  - **TOPO** Displays/removes topographical data (e.g., coastlines, terrain, rivers, lakes) on Inset Map
  - **TERRAIN** Displays/removes terrain information on Inset Map
  - **NEXRAD** Displays/removes NEXRAD weather and coverage information on Inset Map (*optional*)
  - **XM LTNG** Displays/removes XM lightning information on Inset Map (*optional*)

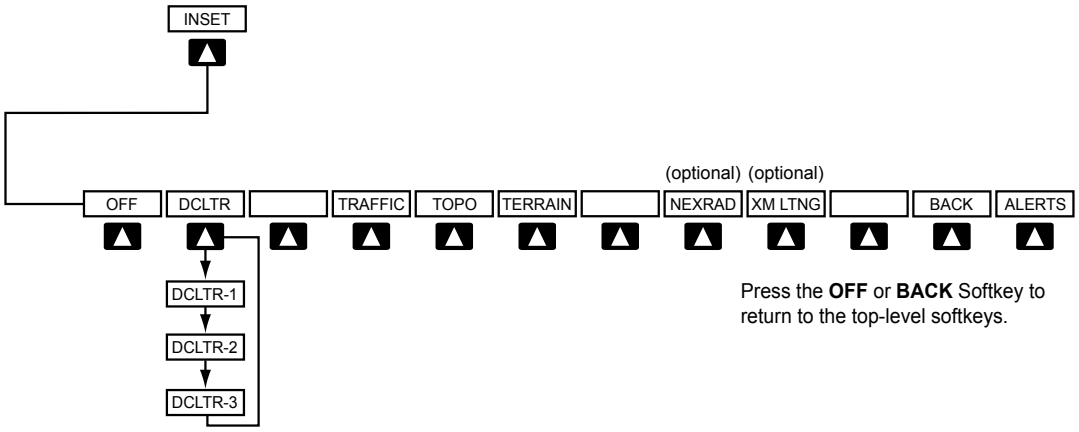


Figure 1-14 INSET Softkeys

- **PFD** Displays second-level softkeys for additional PFD configuration
  - **METRIC** Displays Selected and current altitudes additionally in meters and changes barometric setting to hectopascals (hPa) from inches of mercury (in Hg)
  - **DFLTS** Resets PFD to default settings, including changing units to standard
  - **DME** Displays/removes DME Information Window (*optional*)
  - **BRG1** Cycles the Bearing 1 Information Window through:
    - NAV1: Waypoint frequency/identifier and DME information
    - GPS: Waypoint identifier and GPS distance information
    - ADF: Waypoint frequency
    - Off: Removes window
  - **360 HSI** Displays the HSI as a 360° compass rose
  - **ARC HSI** Displays the HSI as a 140° viewable arc (Bearing Information Windows unavailable)

BRG2 Cycles the Bearing 2 Information Window through:
NAV2: Waypoint frequency/identifier and DME information
GPS: Waypoint identifier and GPS distance information
ADF: Waypoint frequency
Off: Removes window

STD BARO Sets barometric pressure to 29.92 in Hg (1013 hPa if **METRIC** Softkey is selected)

- **OBS** Selects OBS Mode on the CDI when navigating by GPS (only available with active leg)
- **CDI** Cycles CDI through GPS, NAV1 (VOR/LOC), and NAV2 (VOR/LOC) navigation sources
- **ADF/DME** Displays/removes ADF/DME Radio Tuning Window (*optional*; may appear as **ADF**, **DME**, or **ADF/DME** depending on installation)

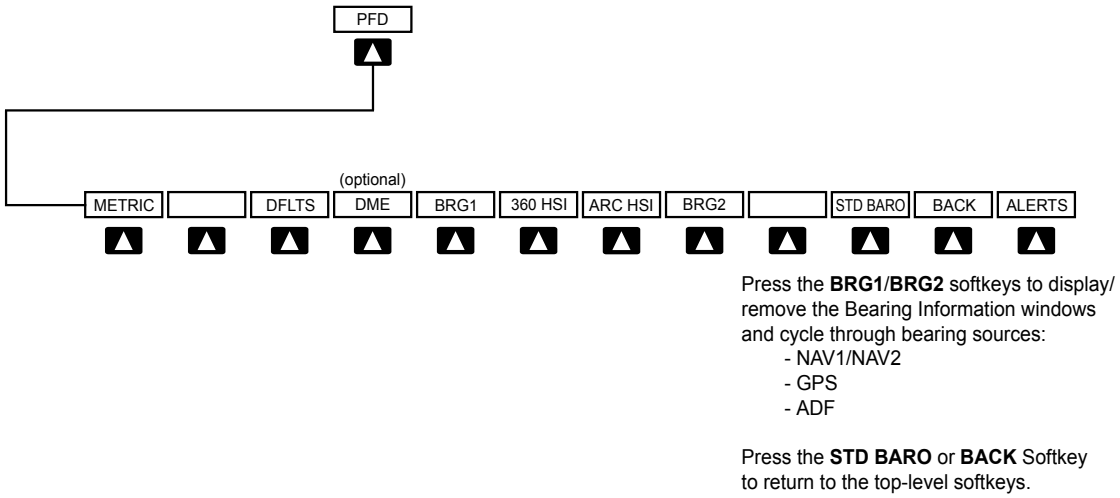


Figure 1-15 PFD Configuration Softkeys

- **XPDR** Displays transponder mode selection softkeys:

STBY Selects standby mode (Transponder does not reply to any interrogations)

ON Selects Mode A (Transponder replies to interrogations)

ALT Selects Mode C – altitude reporting mode (Transponder replies to identification and altitude interrogations)

VFR Automatically enters the VFR code (1200 in U.S.A. only)

CODE Displays transponder code selection softkeys 0-7

0 — 7 Use numbers to enter code

BKSP Removes numbers entered, one at a time

- **IDENT** Activates the Special Position Identification (SPI) pulse for 18 seconds, identifying the transponder return on the ATC screen
- **TMR/REF** Displays/removes Timer/References Window
- **NRST** Displays/removes Nearest Airports Window
- **ALERTS** Displays/removes Alerts Window

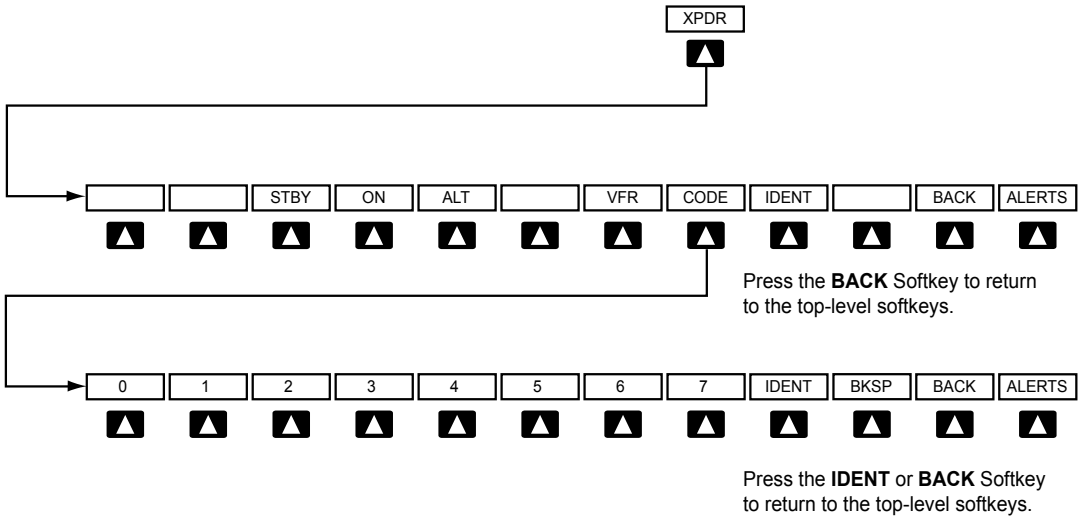


Figure 1-16 XPDR Softkeys

MFD SOFTKEYS

MFD softkeys vary depending on the page selected. EIS and Navigation Map Page (default MFD page) softkeys are described here.

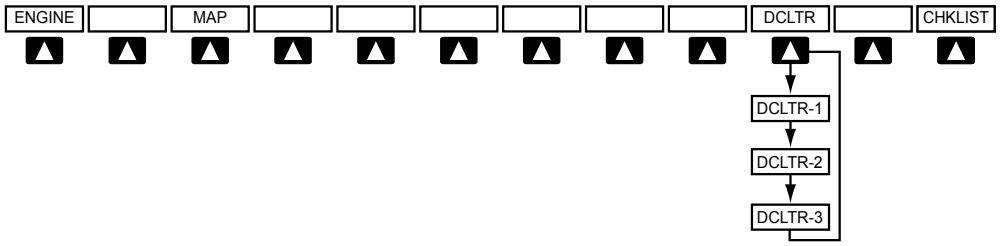


Figure 1-17 Navigation Map Page Softkeys

- **ENGINE** Displays second-level engine softkeys (Figure 1-18; see the EIS Section for more information)
  - **LEAN** Displays the EIS Lean Display (softkeys for engine leaning assist are shown when selected)
  - **SYSTEM** Displays the EIS System Display (softkeys for fuel calculations are shown when selected)
- **MAP** Enables second-level Navigation Map Page softkeys
  - **TRAFFIC** Displays/removes traffic information on Navigation Map Page
  - **TOPO** Displays/removes topographical data (e.g., coastlines, terrain, rivers, lakes) on Navigation Map Page
  - **TERRAIN** Displays/removes terrain information on Navigation Map Page
  - **NEXRAD** Displays/removes NEXRAD weather and coverage information on Navigation Map Page (*optional*)
  - **XM LTNG** Displays/removes XM lightning information on Navigation Map Page (*optional*)
  - **BACK** Returns to top-level softkeys

- **DCLTR (3)** Selects desired amount of map detail; cycles through declutter levels:
  DCLTR (No Declutter): All map features visible
  DCLTR-1: Removes land data
  DCLTR-2: Removes land and SUA data
  DCLTR-3: Removes everything except the active flight plan
- **CHKLIST** Displays the Checklist Page; press the **EXIT** Softkey to return to the top-level softkeys

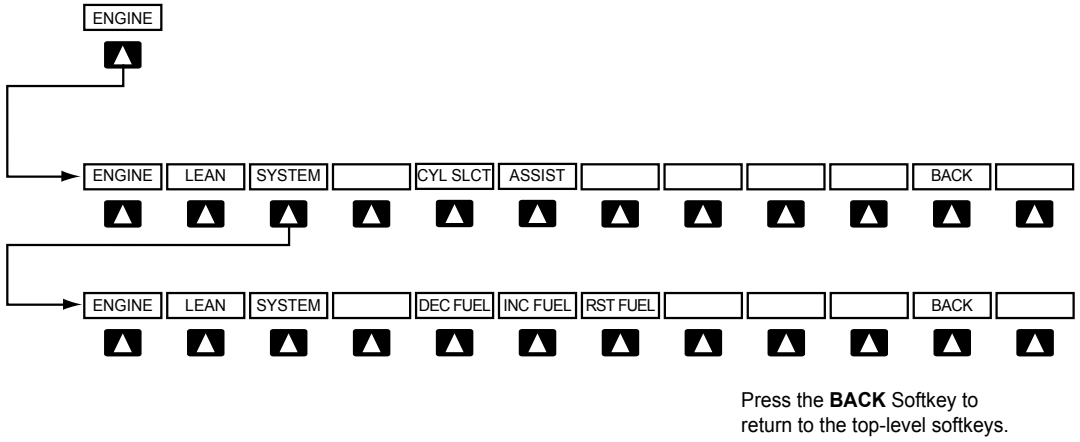


Figure 1-18 ENGINE Softkeys

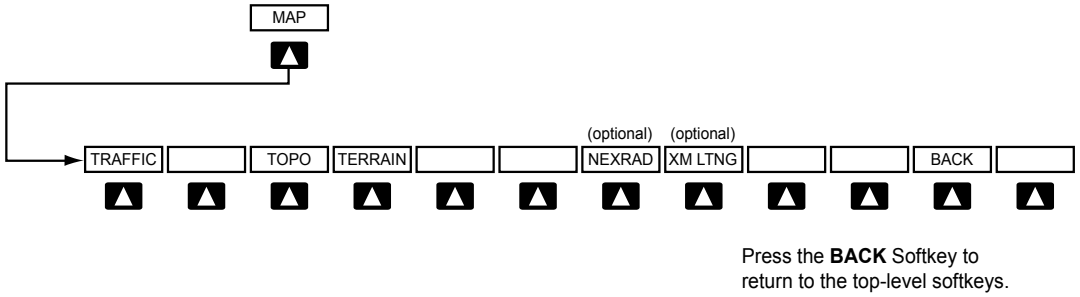


Figure 1-19 MAP Softkeys

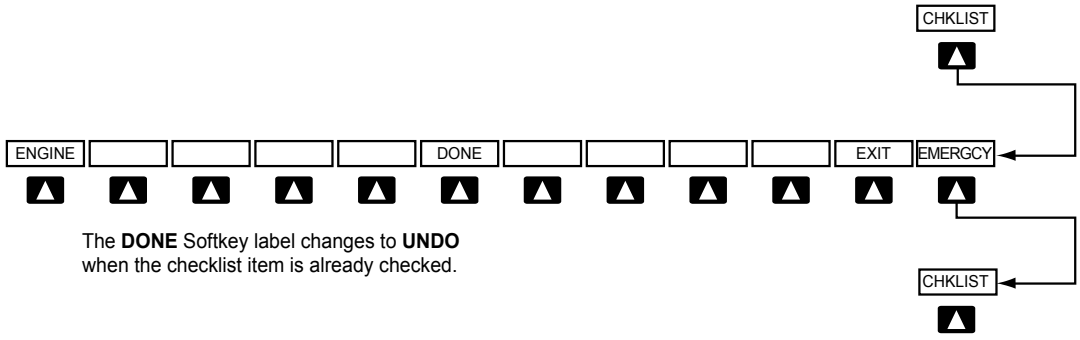


Figure 1-20 Checklist Softkeys

1.7 ACCESSING G1000 FUNCTIONALITY

MENUS

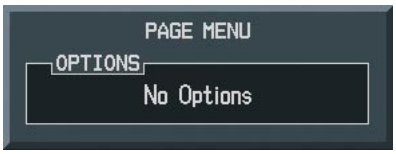
NOTE: *No other window can be displayed on the PFD while the PFD Setup Menu is displayed. Pressing the MENU Key while any other PFD window is displayed does not display the PFD Setup Menu.*

The G1000 has a dedicated **MENU** Key that when pressed displays a context-sensitive list of options. This options list allows the user to access additional features or make settings changes which specifically relate to the currently displayed window/page. There is no all-encompassing menu. Some menus provide access to additional submenus that are used to view, edit, select, and review options. Menus display 'No Options' when there are no additional features or settings for the window/page selected.

Navigating a menu:

1) Press the **MENU** Key to display the menu.
2) Turn the **FMS** Knob to scroll through a list of available options (a scroll bar always appears to the right of the window/box when the option list is longer than the window/box).
3) Press the **ENT** Key to select the desired option.
4) Press the **CLR** Key or **FMS** Knob to remove the menu and cancel the operation.

No Options for NRST Window



Options for FPL Window

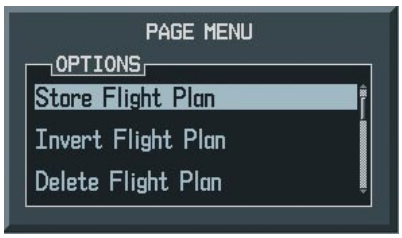


Figure 1-21 Page Menu Examples

DATA ENTRY

The **FMS** Knob can be used for directly entering alphanumeric data (e.g., Flight ID, waypoint identifiers, barometric minimum descent altitude) into the G1000 In some instances, such as when entering an identifier, the G1000 will try to predict the desired identifier based on the characters being entered. In this case, if the desired identifier appears, use the **ENT** Key to confirm the entry without entering the rest of the identifier manually. This can save the pilot from having to enter all the characters of the identifier.

Using the FMS Knob to enter data:

1) If needed, press the **FMS** Knob to activate the cursor.
2) Use the large **FMS** Knob to highlight the desired field.
3) Begin entering data by turning the small **FMS** Knob to select a character for the first placeholder.

Turning the knob to the right scrolls through the alphabet (where appropriate) toward the letter Z, starting in the middle at K, and the digits zero through nine. Turning the knob to the left scrolls in the opposite direction.

4) Use the large **FMS** Knob to move the cursor to the next placeholder in the field.

5) Repeat, using the small **FMS** Knob to select a character and the large **FMS** Knob to move the cursor, until the field is complete.

6) Press the **ENT** Key to confirm entry.

7) Press the **FMS** Knob or **CLR** Key to cancel data entry (the field reverts back to its previous information).

PAGE GROUPS

NOTE: *Refer to other supporting sections in this Pilot's Guide for details on specific pages.*

Information on the MFD is presented on pages which are grouped according to function. The page group and active page title are displayed in the upper center of the screen in light blue. In the bottom right corner of the screen, the current page group, number of pages available in the group, and placement of the current page within the group are indicated by icons. For some of these pages (Airport/Procedure/Weather Information, XM, Procedure Loading), the title of the page changes while the page icon remains the same.

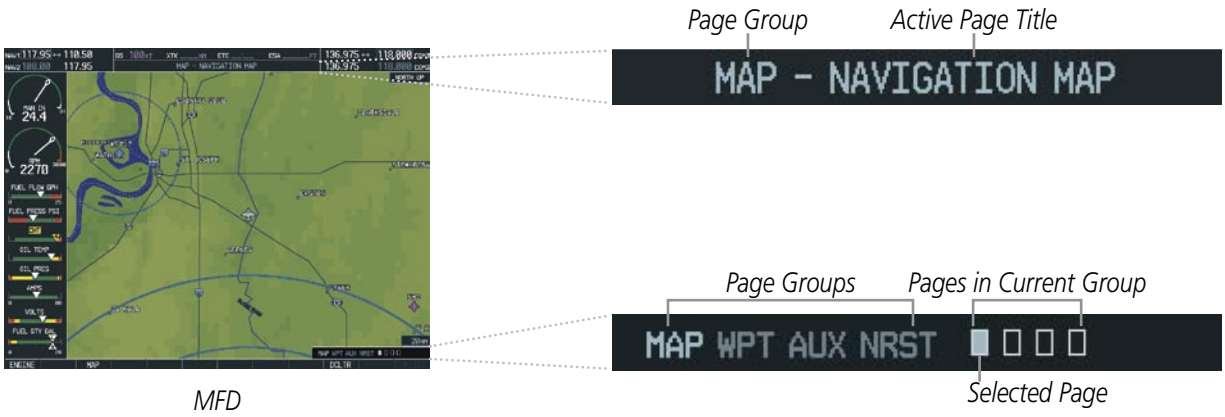


Figure 1-22 Page Title and Page Group Icons

There are four main page groups, navigated using the **FMS** Knob; specific pages within each group can vary depending on the configuration of optional equipment.

Selecting a page using the FMS Knob:

1) Turn the large **FMS** Knob until the desired page group is selected.

2) Turn the small **FMS** Knob until the desired page is selected.

- **Map Page Group (MAP)**

  Navigation Map

  Traffic Map

  Weather Data Link (*optional*)

  Terrain Proximity

Figure 1-23 Map Pages

- **Waypoint Page Group (WPT)**

  Airport/Procedures/Weather Information Pages

  - Airport Information (**INFO** Softkey)
  - Departure Information (**DP** Softkey)
  - Arrival Information (**STAR** Softkey)
  - Approach Information (**APR** Softkey)
  - Weather Information (*optional*) (**WX** Softkey)

  Intersection Information

  NDB Information

  VOR Information

  User Waypoint Information

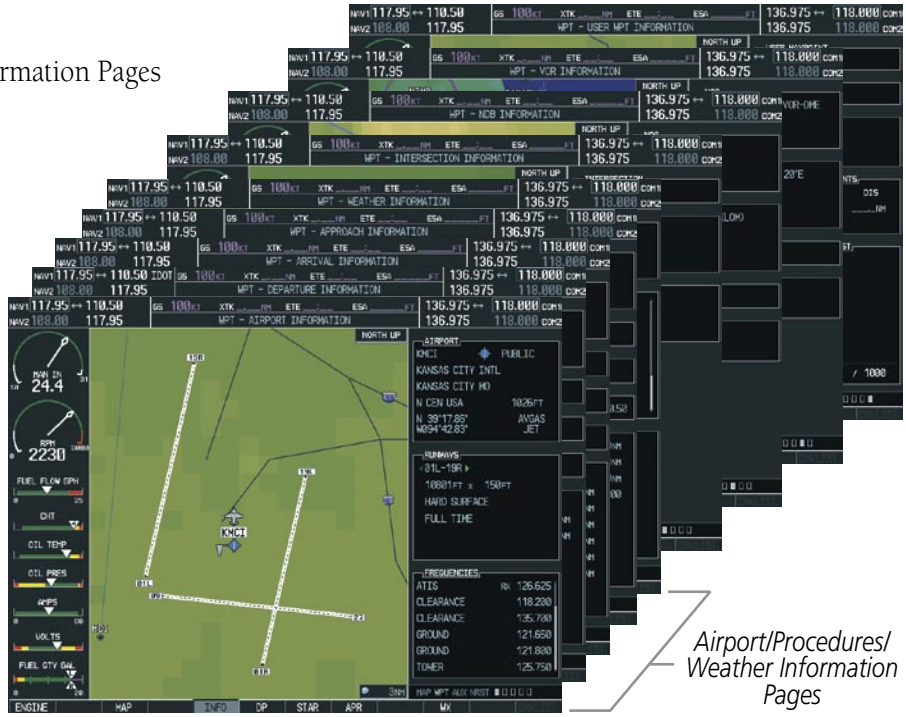


Figure 1-24 Waypoint Pages

- **Auxiliary Page Group (AUX)**

  Trip Planning

  Utility

  GPS Status

  System Setup

  XM Satellite screens (*optional*)

  - XM Information (**INFO** Softkey)
  - XM Radio (**RADIO** Softkey)

  System Status

Figure 1-25 Auxiliary Pages

- **Nearest Page Group (NRST)**

  Nearest Airports

  Nearest Intersections

  Nearest NDB

  Nearest VOR

  Nearest User Waypoints

  Nearest Frequencies

  Nearest Airspaces

Figure 1-26 Nearest Pages

There are also several pages (Airport/Procedures/Weather Information and XM pages) which are selected first from within a main page group with the **FMS** Knob, then with the appropriate softkey at the bottom of the page. In this case, the page remains set to the selected page until a different page softkey is pressed, even if a different page group is selected.

In addition to the main page groups accessed exclusively using the **FMS** Knob, there are pages for flight planning (FPL) and loading procedures (PROC) which are accessed by key. In some instances, softkeys may be used to access the Procedure Loading pages.

The Flight Plan pages are accessed using the **FPL** Key on the MFD. Main pages within this group are selected by turning the small **FMS** Knob.

- **Flight Plan Page Group (FPL)**

  Active Flight Plan

  Flight Plan Catalog

  - Stored Flight Plan (**NEW** Softkey)

  Vertical Navigation

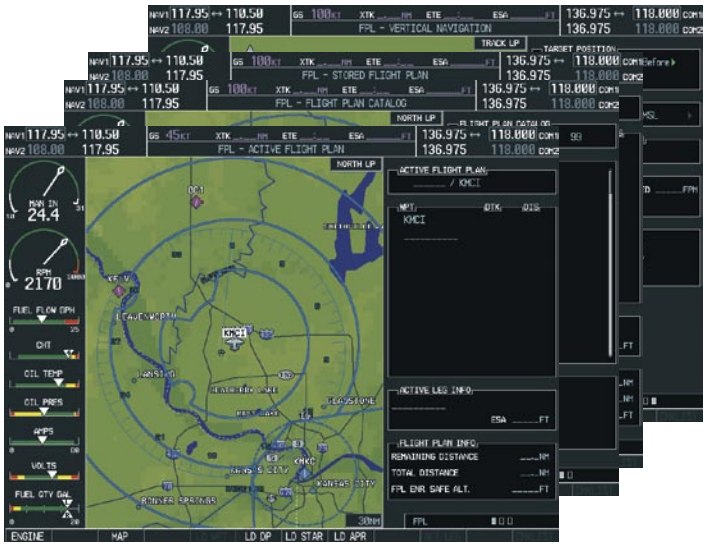


Figure 1-27 Flight Plan Pages

The Procedure Loading pages may be accessed at any time on the MFD by pressing the **PROC** Key. A menu is initialized, and when a departure, approach, or arrival is selected, the appropriate Procedure Loading page is opened. These pages can also be accessed from the Active and Stored Flight Plan pages using the LD softkeys. Turning the **FMS** Knob does not scroll through the Procedure Loading pages (note the single page icon in the lower right corner).

- **Procedure Loading Page Group (PROC)**

  Departure Loading

  Arrival Loading

  Approach Loading

Figure 1-28 Procedure Loading Pages

Information on optional electronic checklist pages is offered later in this section. Checklist pages may be accessed from any page on the MFD using the **CHKLIST** Softkey.

SYSTEM SETUP AND STATUS

In the Auxiliary (AUX) Page Group, there are two system pages: System Setup and System Status. The System Setup Page allows management of various system parameters, while the System Status Page displays the status of all G1000 System LRUs.

AUX - SYSTEM SETUP PAGE

The System Setup Page allows management of the following system parameters:

- Time display format (local or UTC)
- Displayed measurement units
- Map datum
- Airspace alerts
- Arrival alert
- Audio alert voice
- MFD Data Bar (Navigation Status Box) fields
- GPS Course Deviation Indicator (CDI) settings
- COM transceiver channel spacing
- Displayed nearest airports

Figure 1-29 System Setup Page

Pilot Profiles

System settings configured on the System Setup Page may be saved under a pilot profile. The G1000 can store up to 25 profiles; the currently active profile, the amount of memory used, and the amount of memory available are shown at the top of the System Setup Page in the box labeled 'Pilot Profile'. From here, pilot profiles may be created, selected, renamed, or deleted.

Creating a profile:

1) Use the **FMS** Knob to select the System Setup Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight 'CREATE' in the Pilot Profile Box.

4) Press the **ENT** Key. A 'Create Profile' window is displayed.

5) Enter a profile name up to 16 characters long and press the **ENT** Key. Pilot profile names cannot begin with a blank as the first letter.

6) In the next field, use the small **FMS** Knob to select the desired settings upon which to base the new profile. Profiles can be created based on Garmin factory defaults, default profile settings (initially based on Garmin factory defaults unless edited by the pilot), or current system settings.

7) Press the **ENT** Key.

8) With 'CREATE' highlighted, press the **ENT** Key to create the profile

OR:

Use the large **FMS** Knob to select 'CREATE and ACTIVATE' and press the **ENT** Key to activate the new profile.

9) To cancel the process, select 'CANCEL' with the large FMS Knob and press the **ENT** Key.

Selecting an active profile:

1) Use the **FMS** Knob to select the System Setup Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the active profile field in the Pilot Profile Box.

4) Turn the small **FMS** Knob to display the pilot profile list and highlight the desired profile.

5) Press the **ENT** Key. The G1000 loads and displays the system settings for the selected profile.

Renaming a profile:

1) Use the **FMS** Knob to select the System Setup Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight 'RENAME' in the Pilot Profile Box.

4) Press the **ENT** Key.

5) In the 'Rename Profile' window, turn the **FMS** Knob to select the profile to rename.

6) Press the **ENT** Key.

7) Enter a new profile name up to 16 characters long and press the **ENT** Key.
8) With 'RENAME' highlighted, press the **ENT** Key.
9) To cancel the process, use the large **FMS** Knob to select 'CANCEL' and press the **ENT** Key.

Deleting a profile:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight 'DELETE' in the Pilot Profile Box.
4) Press the **ENT** Key.
5) In the 'Delete Profile' window, turn the **FMS** Knob to select the profile to delete.
6) Press the **ENT** Key.
7) With 'DELETE' highlighted, press the **ENT** Key.
8) To cancel the process, use the large **FMS** Knob to select 'CANCEL' and press the **ENT** Key.

DATE/TIME

The System Setup page displays the current date and time and allows the pilot to set the time format (local 12-hr, local 24-hr, or UTC) and offset in the box labeled 'Date/Time'. The time offset is used to define current local time. Universal Coordinated Time (UTC; also called Greenwich Mean Time (GMT) or Zulu) date and time are calculated directly from the GPS satellites signals and cannot be changed. When using a local time format, designate the offset by adding or subtracting the desired number of hours from UTC.

Setting the system time format:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the time format field in the Date/Time Box.
4) Turn the small **FMS** Knob to select the desired system time format (local 12hr, local 24hr, UTC).
5) Press the **ENT** Key.

Setting the current time offset:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the time offset field in the Date/Time Box.
4) Enter the time offset and press the **ENT** Key.

Display Units

The Display Units Box on the System Setup Page allows configuration of the measurement units used for the following displayed data:

- Navigation angle (auto, true)
- Distance and speed (metric, nautical)
- Altitude and vertical speed (feet, meters)
- Barometric pressure (inches of mercury, hectopascals)
- Air temperature (Celsius, Fahrenheit)
- Fuel and fuel flow (gallons, imperial gallons, kilograms, liters, pounds)
- Position (HDDD°MM.MM', HDDD°MM'SS.S", MGRS, UTM/UPS)

For the navigation angle, if 'Auto' is selected, all track, course, and heading information is corrected to the computed magnetic variation (MAG VAR) shown in the Display Units Box . The 'True' setting references all information to true north.

Units of display for the flight instruments are unaffected when the display units for distance, speed, altitude, and vertical speed are changed. Displayed engine parameter temperatures and pressures also remain unaffected when display units for temperature or pressure are changed. Changing the fuel and fuel flow units affects the display of parameters only on the AUX - Trip Planning Page.

Changing a display units setting:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the desired field in the Display Units Box.
4) Turn the small **FMS** Knob to select from a list of measurement units.
5) Press the **ENT** Key when the desired unit is highlighted.
6) To cancel the process without changing the units, press the **CLR** Key.

Map Datum

The Map Datum Box on the System Setup Page allows selection of the map datum to be used by the G1000 from a list of datums available in the current aviation database. The aviation database contains over 100 map datums to adjust position reading to conform to specific paper charts (see Appendix E for a list of available map datums.). The default datum setting is WSG 84. Per TSO C129a, the WSG 84 map datum should be used in the United States.

For use outside the U.S., select the geodetic datum required by that country. If charts based on another datum are being used, the G1000 should be set to use the same datum. Using a map datum that does not match the paper charts can result in significant differences in position information. If paper charts are being used for reference only, the G1000 still provides correct navigation guidance to the waypoints contained in the database, regardless of the datum selected.

Changing the map datum:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the datum in the Map Datum Box.

4) Turn the small **FMS** Knob to display and scroll through the list of available map datums.

5) Press the **ENT** Key when the desired datum is highlighted.

Airspace Alerts

The Airspace Alerts Box allows the pilot to turn the controlled/special-use airspace message alerts on or off. This does not affect the alerts listed on the Nearest Airspaces Page or the airspace boundaries depicted on the Navigation Map Page. It simply turns on/off the warning provided when the aircraft is approaching or near an airspace. Alerts for the following airspaces can be turned on/off in the Airspace Alerts Box:

- Class B/TMA
- Class C/TCA
- Class D
- Restricted
- MOA (Military)
- Other airspaces

An altitude buffer is also provided which "expands" the vertical range above or below an airspace. For example, if the buffer is set at 500 feet, and the aircraft is more than 500 feet above/below an airspace, an alert message will not be generated, but if the aircraft is less than 500 feet above/below an airspace and projected to enter it, the pilot is notified with an alert message. The default setting for the altitude buffer is 200 feet.

Changing the altitude buffer distance setting:

1) Use the **FMS** Knob to select the System Setup Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the altitude buffer field in the Airspace Alerts Box.

4) Enter an altitude buffer value and press the **ENT** Key.

Turning an airspace alert on or off:

1) Use the **FMS** Knob to select the System Setup Page.

2) Press the **FMS** Knob momentarily to activate the flashing cursor.

3) Turn the large **FMS** Knob to highlight the desired field in the Airspace Alerts Box.

4) Turn the small **FMS** Knob clockwise to turn the airspace alert ON or counterclockwise to turn the alert OFF.

Arrival Alerts

The Arrival Alert Box on the System Setup Page allows arrival alerts to be turned on/off and the alert trigger distance set. An arrival alert can be set to notify the pilot with a message upon reaching a user-specified distance from the final destination (the direct-to waypoint or the last waypoint in a flight plan). Once the set distance (up to 99.9 units) has been reached, an "Arrival at [waypoint]" message is displayed in the PFD Navigation Status Box.

Enabling/disabling an arrival alert:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to select the ON/OFF field in the Arrival Alert Box.
4) Turn the small **FMS** Knob clockwise to turn the airspace alert ON or counterclockwise to turn the alert OFF.

Changing the arrival alert trigger distance:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the distance field in the Arrival Alert Box.
4) Enter a trigger distance and press the **ENT** Key.

Audio Alerts

The Audio Alert Box on the System Setup Page allows the audio alert voice to be set to male or female.

Changing the audio alert voice:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the voice in the Audio Alert Box.
4) Turn the small **FMS** Knob to display and highlight the desired voice.
5) Press the **ENT** Key.

MFD Data Bar Fields

The MFD Data Bar Fields Box on the System Setup Page can be used to change the configuration of the data fields in the Navigation Status Box on the MFD. By default, the Navigation Status Box is set to display ground speed (GS), distance to next waypoint (DIS), estimated time enroute (ETE), and enroute safe altitude (ESA). The Navigation Status Box on the PFD is not affected.

The following data may be selected for display in the four fields of the MFD Navigation Status Box.

- Bearing (BRG)
- Distance (DIS)
- Desired Track (DTK)
- Enroute Safe Altitude (ESA)
- Estimated Time of Arrival (ETA)
- Estimated Time Enroute (ETE)
- Ground Speed (GS)
- Minimum Safe Altitude (MSA)
- Track Angle Error (TKE)
- Track (TRK)
- Vertical Speed Required (VSR)
- Crosstrack Error (XTK)

Changing the information shown in an MFD Navigation Status Box field:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the desired field number in the MFD Data Bar Fields Box.
4) Turn the small **FMS** Knob to highlight the desired selection from the data options list.
5) Press the **ENT** Key.

GPS CDI

The GPS CDI Box on the System Setup Page allows the pilot to define the range for the on-screen Course Deviation Indicator (CDI). The range values represent full range deflection for the CDI to either side. The default setting is 'AUTO'. At this setting, leaving the departure airport the CDI range is set to 1.0 nm and gradually ramps up to 5 nm beyond 30 nm from the departure airport. The CDI range is set to 5.0 nautical miles during the enroute phase of flight. Within 30 nm of the destination airport, the CDI range gradually ramps down to 1.0 nm (terminal area). During approach operations, the CDI range ramps down even further to 0.3 nm. This transition normally occurs within 2.0 nm of the final approach fix (FAF).

If a lower CDI range setting is selected (i.e., 1.0 or 0.3 nm), the higher range settings are not selected during any phase of flight. For example, if 1.0 nm is selected, the G1000 uses this for enroute and terminal phases and ramps down to 0.3 nm during an approach. Note that the Receiver Autonomous Integrity Monitoring (RAIM) protection limits follow the selected CDI range and corresponding flight phases.

The GPS CDI Box on the System Setup Page displays the following:

- Selected CDI range (AUTO, 5 nm, 1 nm, 0.3 nm)
- Current system CDI range (5 nm, 1 nm, 0.3 nm)
- ILS CDI capture mode setting (AUTO, MANUAL)

Changing the CDI range:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the selected field in the GPS CDI Box.
4) Turn the small **FMS** Knob to highlight the desired selection from the range list.
5) Press the **ENT** Key.

Changing the ILS CDI capture setting:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the ILS CDI capture field in the GPS CDI Box.
4) Turn the small **FMS** Knob to select the desired mode.
5) Press the **ENT** Key.

COM Configuration

The COM Configuration Box on the System Setup Page allows the pilot to select 8.33 kHz or 25.0 kHz COM frequency channel spacing.

Changing COM channel spacing:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the channel spacing field in the COM Configuration Box.
4) Turn the small **FMS** Knob to select the desired spacing.
5) Press the **ENT** Key.

Nearest Airports

The Nearest Airports Box on the System Setup Page defines the minimum runway length and surface type used when determining the nine nearest airports to display on the MFD Nearest Airports Page. A minimum runway length and/or surface type can be entered to prevent airports with small runways or runways that are not of appropriate surface from being displayed. Default settings are 0 feet (or meters) for runway length and "any" for runway surface type.

Selecting nearest airport surface matching criteria (any, hard only, hard/soft, water):

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the runway surface field in the Nearest Airports Box.
4) Turn the small **FMS** Knob to select the desired runway option (any, hard only, hard/soft, water).
5) Press the **ENT** Key.

Selecting nearest airport minimum runway length matching criteria:

1) Use the **FMS** Knob to select the System Setup Page.
2) Press the **FMS** Knob momentarily to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the minimum length field in the Nearest Airport Box.
4) Enter the minimum runway length (zero to 99,999 feet) and press the **ENT** Key.

AUX - SYSTEM STATUS PAGE

The System Status Page displays the status and software version numbers for all detected system LRUs. Pertinent information on all system databases is also displayed. Active LRUs are indicated by green check marks and failed LRUs are indicated by red 'X's. Failed LRUs should be noted and a Diamond service center or Garmin-authorized dealer informed.

Figure 1-30 Example System Status Page

The **LRU**, **ARFRM**, and **DBASE** softkeys on the System Status Page select the box (LRU Info, Airframe, or Database) through which the **FMS** Knob can be used to scroll if all the information cannot appear on the screen. The cursor can also be placed in the desired box using the System Status Page Menu.

The **ANN TEST** Softkey, when depressed, causes an annunciation test tone to be played.

ELECTRONIC CHECKLISTS (OPTIONAL)

NOTE: *The checklists presented in this section are for example only and may not reflect checklists actually available for the Beechcraft A36/G36. The information described in this section is not intended to replace the checklist information described in the AFM or the Pilot Safety and Warning Supplements document.*

NOTE: *Garmin is not responsible for the content of the checklists. User-defined checklists are created by the aircraft manufacturer. Modifications or updates to the checklists are coordinated through the aircraft manufacturer. The user cannot edit the checklists.*

The MFD is able to display electronic checklists customized for the Beechcraft A36/G36. The G1000 accesses the checklists from an SD card inserted into the bezel slot (see Figure 1-3). Selecting the **CHKLIST** Softkey allows access to all checklists. Selecting the **EXIT** Softkey or momentarily holding down the **CLR** Key exits the Checklist Page and returns to the page last viewed.

If the SD card contains a valid checklist file, the power-up splash screen displays both the aircraft make and model to which the checklist applies and copyright information. If the SD card contains an invalid checklist file or no checklist, the Checklist Page displays 'INVALID CHECKLIST' or 'CHECKLIST NOT PRESENT' and the **CHKLIST** Softkey is greyed out. Selecting the **EMERGCY** Softkey accesses the emergency procedures.

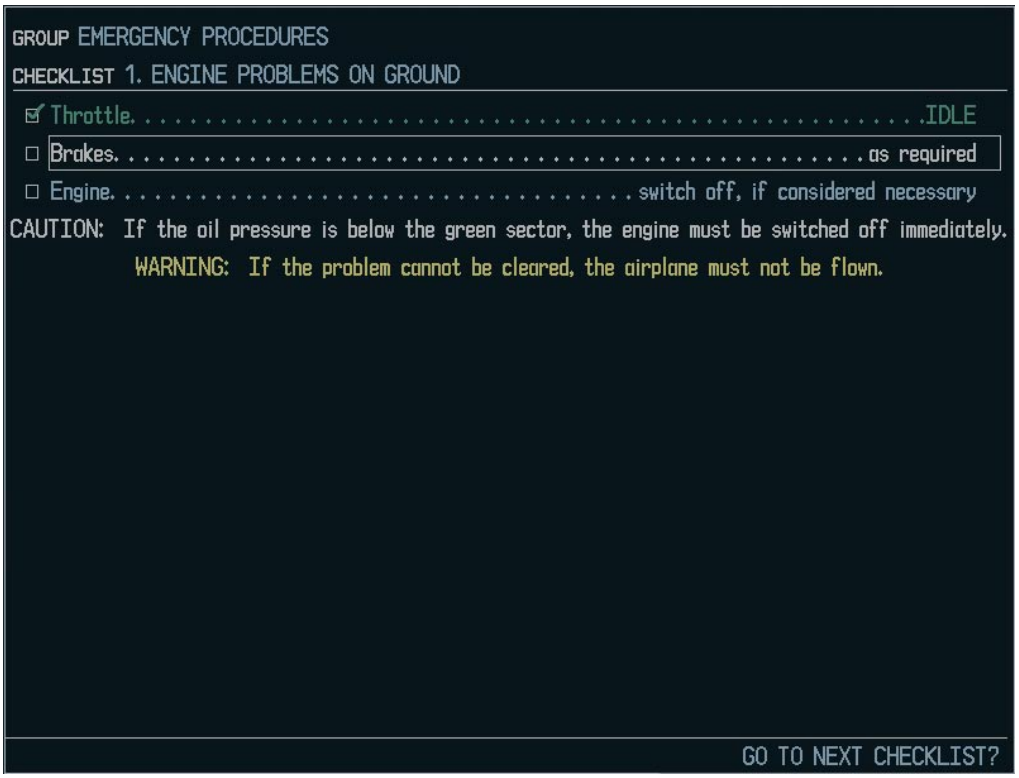

GROUP EMERGENCY PROCEDURES
CHECKLIST 1. ENGINE PROBLEMS ON GROUND
Throttle. . . . . .IDLE
Brakes. . . . . .as required
Engine. . . . . .switch off, if considered necessary
CAUTION: If the oil pressure is below the green sector, the engine must be switched off immediately.
WARNING: If the problem cannot be cleared, the airplane must not be flown.
GO TO NEXT CHECKLIST?

Figure 1-31 Checklist Page Example

The Checklist Page displays the following:

- Selected procedure group (number of procedure groups depends on airframe)
- Selected checklist title
- Selected checklist text:
  - Plain text
  - Notes, Cautions, and Warnings
  - Challenge/Response pairs
  - Challenges with no responses
  - Check state of items
  - Checklist complete indicator

Navigating a checklist:

1) From any page, select the **CHKLIST** Softkey.

2) Turn the large **FMS** Knob to select the 'GROUP' field.

3) Turn the small **FMS** Knob to select the desired procedure.

4) Press the **ENT** Key.

5) Turn the large **FMS** Knob to select the 'Checklist' field.

6) Turn the **FMS** Knob to select the desired checklist.

7) Press the **ENT** Key.

8) With the desired checklist displayed, turn the **FMS** Knob to move up and down the checklist and highlight an item with a hollow white rectangle. The default color for non-selected checklist items is blue; once an item is highlighted, it turns white.

Press the **CLR** Key to remove a check mark from an item.

9) Once the last item in a checklist is selected, 'GO TO THE NEXT CHECKLIST?' is highlighted. Press the **ENT** Key to advance to the next checklist displayed.

10) To select a checklist item that is highlighted, press the **ENT** Key or **DONE** Softkey. Selected items turn green and checkmarks are placed in the boxes next to the item. After an item is selected, the next item is automatically highlighted for selection.

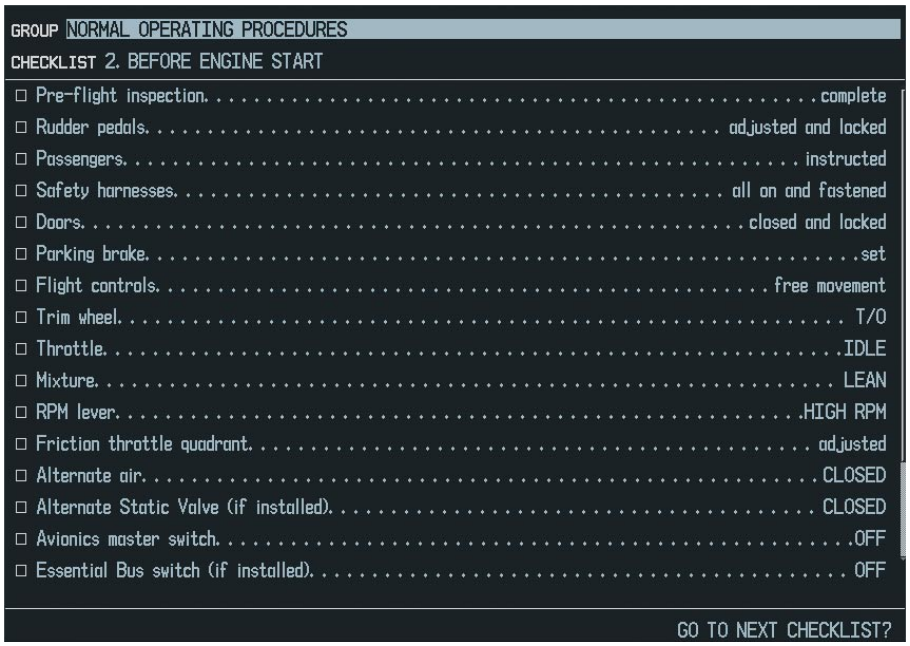

GROUP NORMAL OPERATING PROCEDURES
CHECKLIST 2. BEFORE ENGINE START
☐ Pre-flight inspection. . . . . complete
☐ Rudder pedals. . . . . adjusted and locked
☐ Passengers. . . . . instructed
☐ Safety harnesses. . . . . all on and fastened
☐ Doors. . . . . closed and locked
☐ Parking brake. . . . . set
☐ Flight controls. . . . . free movement
☐ Trim wheel. . . . . T/O
☐ Throttle. . . . . IDLE
☐ Mixture. . . . . LEAN
☐ RPM lever. . . . . HIGH RPM
☐ Friction throttle quadrant. . . . . adjusted
☐ Alternate air. . . . . CLOSED
☐ Alternate Static Valve (if installed). . . . . CLOSED
☐ Avionics master switch. . . . . OFF
☐ Essential Bus switch (if installed). . . . . OFF
GO TO NEXT CHECKLIST?

Figure 1-32 Sample Checklist

1.8 DISPLAY BACKLIGHTING

The backlighting of the PFD and MFD displays and bezel and Audio Panel keys can be adjusted automatically or manually. The default setting (automatic backlighting adjustment) uses photocell technology to automatically adjust for ambient lighting conditions. Photocell calibration curves are pre-configured to optimize display appearance through a broad range of cockpit lighting conditions. Manual backlighting adjustment can be accomplished using the existing instrument panel dimmer bus or the following procedures. In normal operating mode, backlighting can only be adjusted from the PFD. In Reversionary Mode, it can be adjusted from the remaining display.

Adjusting display backlighting:

1) Press the PFD **MENU** Key to display the PFD Setup Menu. 'AUTO' is now highlighted next to 'PFD DSPL'.

2) Turn the small **FMS** Knob to select 'MANUAL'.

3) Press the **ENT** Key.

4) With the intensity value now highlighted, enter the desired backlighting then press the **ENT** Key.

5) Turn the large **FMS** Knob to highlight 'AUTO' next to 'MFD DSPL' and repeat steps 2-4.

6) To remove the menu, press the **CLR** or **MENU** Key.

Adjusting key backlighting:

1) Press the PFD **MENU** Key to display the PFD Setup Menu. 'AUTO' is now highlighted next to 'PFD DSPL'.

2) Turn the large **FMS** Knob to highlight 'PFD DSPL'.

3) Turn the small **FMS** Knob in the direction of the green arrowhead to display 'PFD KEY'.

4) Turn the large **FMS** Knob to highlight 'AUTO'.

5) Turn the small **FMS** Knob to select 'MANUAL'.

6) Press the **ENT** Key.

7) With the intensity value now highlighted, enter the desired backlighting and press the **ENT** Key.

8) Turn the large **FMS** Knob to highlight 'MFD DSPL'.

9) Turn the small **FMS** Knob in the direction of the green arrowhead to display 'MFD KEY' and repeat steps 4-7.

10) To remove the menu, press the **CLR** or **MENU** Key.

PFD

Figure 1-33 PFD Setup Menu

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SECTION 2 FLIGHT INSTRUMENTS

2.1 INTRODUCTION

WARNING: *In the event that the airspeed, attitude, altitude, or heading indications become unusable, refer to the backup instruments.*

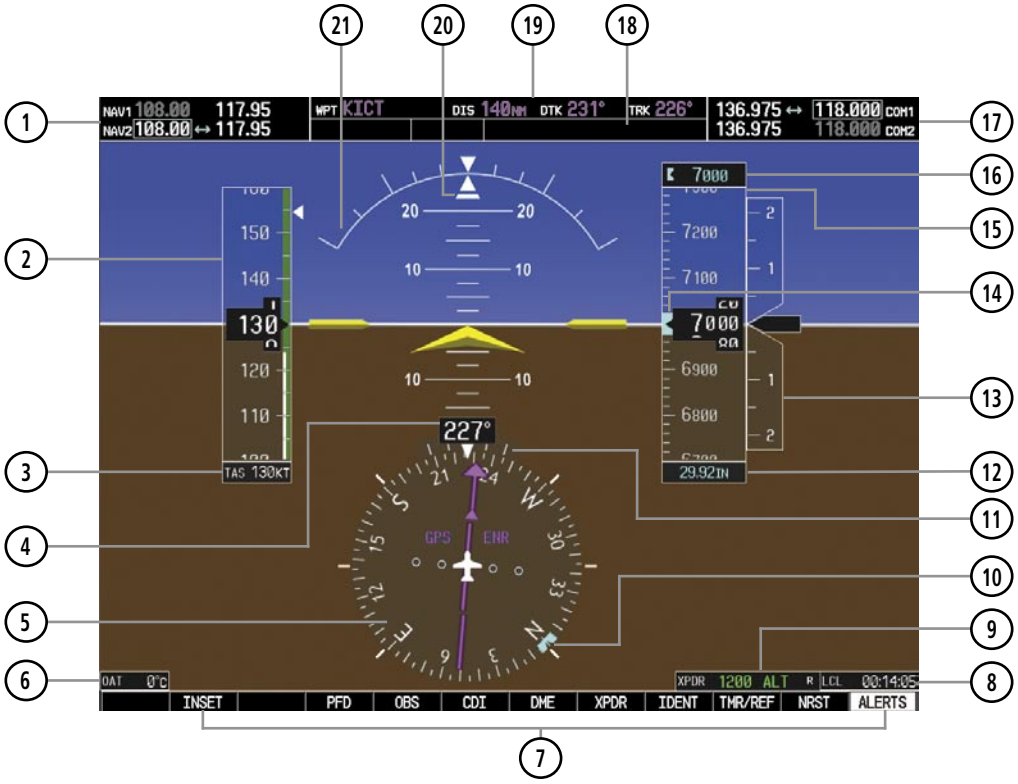
NOTE: *The Automatic Flight Control System (AFCS) provides additional readouts and bugs on selected flight instruments. Refer to the AFCS Section for details on these bugs and readouts, as they appear on the display during certain AFCS modes.*

The G1000 System controls were designed so that regardless of which seat the pilot is flying from, the aircraft can be flown with one hand and the controls manipulated with the other hand. Increased situational awareness is provided by replacing the traditional instrument "six-pack" on the instrument panel with an easy-to-scan display that provides a large horizon, airspeed, attitude, altitude, vertical speed, and course deviation information. In addition to the flight instruments, navigation, communication, annunciations, terrain, traffic, and weather information are also presented on the PFD and explained in other sections of this Pilot's Guide

The following flight instruments and supplemental flight data are displayed on the PFD:

- Airspeed Indicator, showing
  - True airspeed
  - Airspeed awareness ranges
  - Trend vector
  - Reference flags
- Attitude Indicator with slip/skid indication
- Altimeter, showing
  - Trend vector
  - Barometric setting
  - Selected Altitude
- Vertical Deviation/Glideslope Indicator
- Vertical Speed Indicator (VSI)
- Horizontal Situation Indicator, showing
  - Heading and course indications
  - Turn Rate Indicator
  - Navigation source
  - Course Deviation Indicator (CDI)
  - Bearing pointers and information windows
  - DME Information Window
- Outside air temperature (OAT)
- System time
- Timer/References Window, showing
  - Generic timer
  - Vspeed values and flags
  - Barometric minimum descent altitude (MDA, DH)

The PFD also displays various alerts and annunciations.



1. *NAV Frequency Box*
2. *Airspeed Indicator*
3. *True Airspeed*
4. *Current Heading*
5. *Horizontal Situation Indicator (HSI)*
6. *Outside Air Temperature (OAT)*
7. *Softkeys*
8. *System Time*
9. *Transponder Data Box*
10. *Selected Heading Bug*
11. *Turn Rate Indicator*
12. *Altimeter Barometric Setting*
13. *Vertical Speed Indicator (VSI)*
14. *Selected Altitude Bug*
15. *Altimeter*
16. *Selected Altitude*
17. *COM Frequency Box*
18. *AFCS Status Box*
19. *Navigation Status Box*
20. *Slip/Skid Indicator*
21. *Attitude Indicator*

Figure 2-1 Primary Flight Display (Default)

1. *Traffic Annunciation*
2. *Selected Heading*
3. *Inset Map*
4. *DME Information Window*
5. *Bearing Information Windows*
6. *Selected Course*
7. *Alerts Window*
8. *Barometric Minimum Descent Altitude*
9. *Annunciation Window*
10. *Vertical Deviation/Glideslope Indicator*
11. *Marker Beacon Annunciation*
12. *AFCS Status Annunciation*

Figure 2-2 Additional PFD Information

2.2 FLIGHT INSTRUMENTS

AIRSPEED INDICATOR

NOTE: *Refer to the Aircraft Flight Manual (AFM) for speed criteria.*

The Airspeed Indicator displays airspeed on a rolling number gauge using a moving tape. The true airspeed is displayed in knots below the Airspeed Indicator.

The numeric labels and major tick marks on the moving tape are marked at intervals of 10 knots, while minor tick marks on the moving tape are indicated at intervals of 5 knots. Speed indication starts at 20 knots, with 60 knots of airspeed viewable at any time. The actual airspeed is displayed inside the black pointer. The pointer remains black until reaching never-exceed speed (V_{NE}), at which point it turns red.

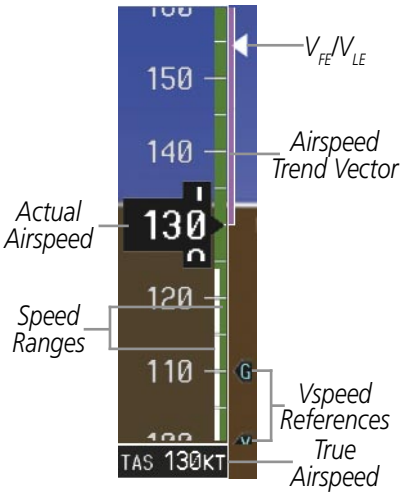


Figure 2-3 Airspeed Indicator

Figure 2-4 Red Pointer at V_{NE}

SPEED AWARENESS RANGES

A color-coded (white, green, yellow, and red) speed range strip is located on the moving tape. The colors denote flaps operating range, normal operating range, caution range, and never-exceed speed (V_{NE}). A red range is also present for low speed awareness.

AIRSPEED TREND VECTOR

The Airspeed Trend Vector is a vertical, magenta line, extending up or down on the airspeed scale, shown to the right of the color-coded speed range strip. The end of the trend vector corresponds to the predicted airspeed in 6 seconds if the current rate of acceleration is maintained. If the trend vector crosses V_{NE}, the text of the actual airspeed readout changes to yellow. The trend vector is absent if the speed remains constant or if any data needed to calculate airspeed is not available due to a system failure.

VSPEED REFERENCES

NOTE: *Refer to the AFM for Vspeed values.*

Vspeeds (Glide, V_R, V_X, and V_Y) can be changed and their flags turned on/off from the Timer/References Window. When active (on), the Vspeeds are displayed at their respective locations to the right of the airspeed scale. By default, all Vspeed values are reset and all flags turned off when power is cycled.

Changing Vspeeds and turning Vspeed flags on/off:

1) Press the **TMR/REF** Softkey.
2) Turn the large **FMS** Knob to highlight the field of the desired Vspeed to be changed.
3) Use the **FMS** Knob to enter the desired speed and press the **ENT** Key (when a speed has been changed from a default value, an asterisk appears next to the speed).
4) With the flag ON/OFF field highlighted, turn the small **FMS** Knob clockwise to ON or counterclockwise to OFF.
5) To remove the window, press the **CLR** Key or the **TMR/REF** Softkey.

Figure 2-5 Timer/References Window

Figure 2-6 Timer/References Menu

Turning all Vspeed flags on/off:

1) Press the **TMR/REF** Softkey.
2) Press the **MENU** Key.
3) To activate all Vspeed flags, press the **ENT** Key with 'All References On' highlighted.
4) To remove all Vspeed flags, turn the **FMS** Knob to highlight 'All References Off' and press the **ENT** Key.

Restoring all Vspeed defaults:

1) Press the **TMR/REF** Softkey.
2) Press the **MENU** Key.
3) Turn the **FMS** Knob to highlight 'Restore Defaults' and press the **ENT** Key.

ATTITUDE INDICATOR

NOTE: Some supplemental PFD information disappears when pitch exceeds +30°/-20° or bank exceeds 65°.

Attitude information is displayed over a virtual blue sky and brown ground with a white horizon line. The Attitude Indicator displays the pitch, roll, and slip/skid information.

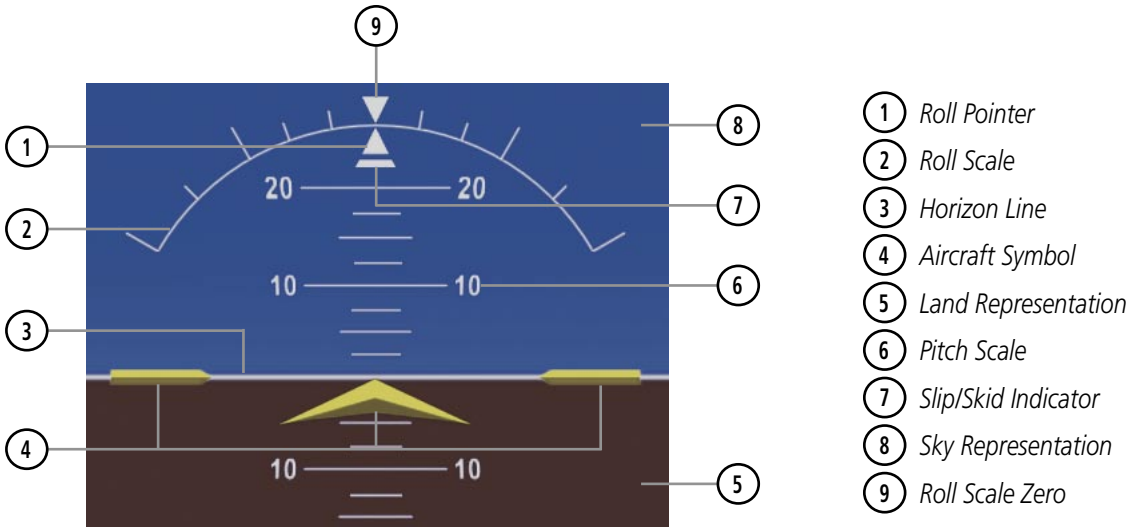
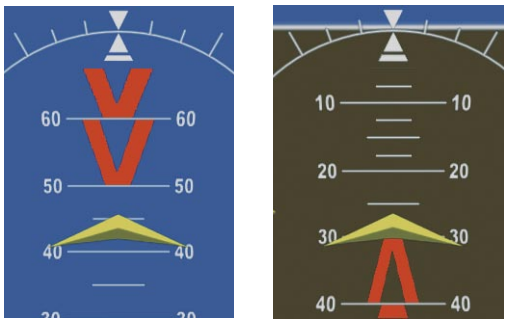


Figure 2-7 Attitude Indicator

PITCH INDICATION

The horizon line is part of the pitch scale. Above and below the horizon line, major pitch marks and numeric labels are shown for every 10°, up to 80°. Minor pitch marks are shown for intervening 5° increments, up to 25° below and 45° above the horizon line. Between 20° below to 20° above the horizon line, minor pitch marks occur every 2.5°.

Red extreme pitch warning chevrons pointing toward the horizon are displayed, starting at 50° above and 30° below the horizon line.



Nose High *Nose Low*

Figure 2-8 Pitch Attitude Warnings

ROLL AND SLIP/SKID INDICATION

The inverted white triangle indicates zero on the roll scale. Major tick marks at 30˚ and 60˚ and minor tick marks at 10˚, 20˚, and 45˚ are shown to the left and right of the zero. Angle of bank is indicated by the position of the pointer on the roll scale.

The Slip/Skid Indicator is the bar beneath the roll pointer. The indicator moves with the roll pointer and moves laterally away from the pointer to indicate lateral acceleration. Slip/skid is indicated by the location of the bar relative to the pointer. One bar displacement is equal to one ball displacement on a traditional slip/skid indicator.

Figure 2-9 Slip/Skid Indication

ALTIMETER

The Altimeter displays 600 feet of barometric altitude values at a time on a rolling number gauge using a moving tape. Numeric labels and major tick marks are shown at intervals of 100 feet. Minor tick marks are at intervals of 20 feet. The current altitude is displayed in the black pointer.

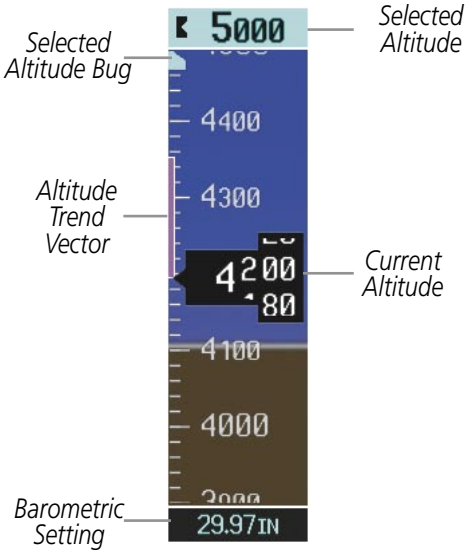


Figure 2-10 Altimeter

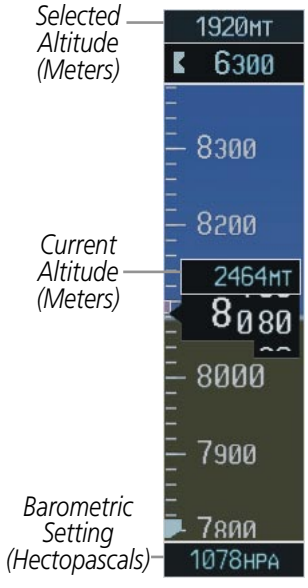


Figure 2-11 Altimeter (Metric)

ALTITUDE TREND VECTOR

A magenta Altitude Trend Vector extends up or down the left of the altitude tape, the end resting at the approximate altitude to be reached in 6 seconds at the current vertical speed. The trend vector is not shown if altitude remains constant or if data needed for calculation is not available due to a system failure.

ALTIMETER BAROMETRIC SETTING

The Altimeter barometric pressure setting is displayed below the Altimeter in inches of mercury (in Hg) or hectopascals (hPa) when the **METRIC** Softkey is selected.

Selecting the barometric Altimeter setting:

Turn the **BARO** (outer) Knob to select the desired setting.

Selecting standard barometric pressure (29.92 in Hg):

1) Press the **PFD** Softkey.
2) Press the **STD BARO** Softkey.

SELECTED ALTITUDE

NOTE: *See the AFCS Section for more information about how the G1000 uses the Selected Altitude.*

The Selected Altitude is displayed above the Altimeter in the box indicated by a selection bug symbol. A bug corresponding to this altitude is shown on the tape; if the Selected Altitude exceeds the range shown on the tape, the bug appears at the corresponding edge of the tape. The metric value, when selected, is displayed in a separate box above the Selected Altitude.

Setting the Selected Altitude:

Turn the **ALT** Knob to set the Selected Altitude (large knob for 1000-ft increments, small for 100-ft increments).

METRIC DISPLAY

Selected and current altitudes can be displayed in meters (readouts displayed above the normal readouts in feet) and the Altimeter barometric setting in hectopascals (see Figure 2-11). Note that the altitude tape does not change scale.

Displaying altitude and the Altimeter barometric setting in metric units:

1) Press the **PFD** Softkey to display the second-level softkeys.
2) Press the **METRIC** Softkey to display altitudes in meters and the barometric pressure setting in hectopascals.
3) Press the **BACK** Softkey to return to the top-level softkeys.

VERTICAL DEVIATION/GLIDESLOPE INDICATOR

The Vertical Deviation/Glideslope Indicator (Figure 2-12) appears to the left of the Altimeter when an ILS is tuned in the active NAV field (and selected on the Audio Panel). A green diamond appears and acts as the Vertical Deviation Indicator, like a glideslope needle on a conventional indicator.

VERTICAL SPEED INDICATOR (VSI)

***NOTE:** Digits appear in the pointer when the climb or descent rate is greater than 100 fpm.*

The Vertical Speed Indicator (VSI; Figure 2-13) displays the aircraft's vertical speed with numeric labels and tick marks at 1000 and 2000 fpm in each direction on the non-moving tape. Minor tick marks are at intervals of 500 fpm.

The current vertical speed is displayed in the pointer, which also points to that speed on the non-moving tape. If the rate of ascent/descent exceeds 2000 fpm, the pointer appears at the corresponding edge of the tape and the rate appears inside the pointer.

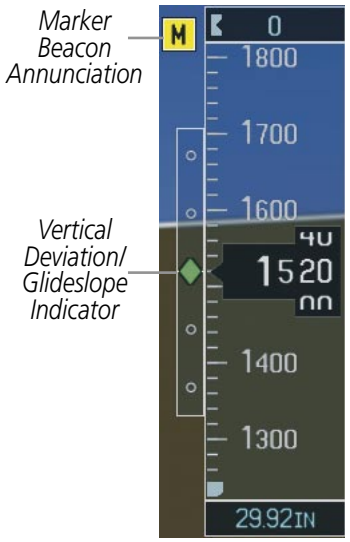


Figure 2-12 Vertical Deviation/Glideslope Indicator

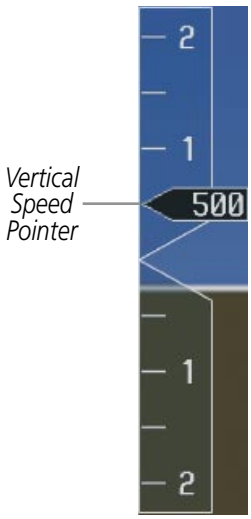


Figure 2-13 Vertical Speed Indicator

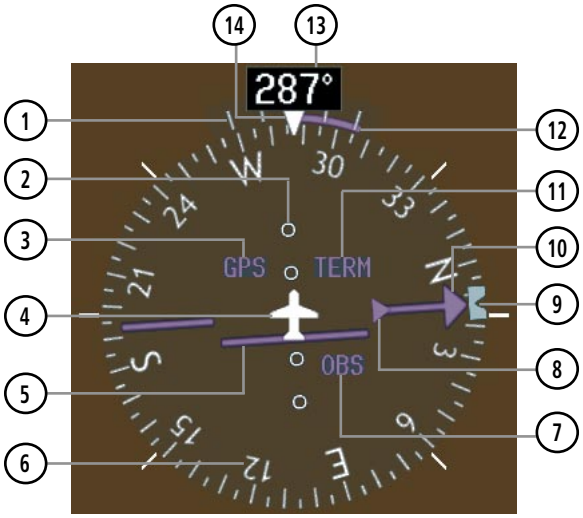
HORIZONTAL SITUATION INDICATOR (HSI)

The Horizontal Situation Indicator (HSI) displays a rotating compass card in a heading-up orientation. Letters indicate the cardinal points and numeric labels occur every 30°. Major tick marks are at 10° intervals and minor tick marks at 5° intervals. The HSI presents heading, turn rate, course deviation, bearing, and navigation source information and is available in two formats (360° compass rose and 140° arc).

Changing the HSI display format:

1) Press the **PFD** Softkey
2) Press the **360 HSI** or **ARC HSI** Softkey.

The 360° HSI (Figure 2-14) contains a Course Deviation Indicator (CDI), with a Course Pointer, To/From Indicator, and a sliding deviation bar and scale. The course pointer is a single line arrow (GPS, VOR1, and LOC1) or a double line arrow (VOR2 and LOC2) which points in the direction of the set course. The To/From arrow rotates with the course pointer and is displayed when the active NAVAID is received.



1. *Turn Rate Indicator*
2. *Lateral Deviation Scale*
3. *Navigation Source*
4. *Aircraft Symbol*
5. *Course Deviation Indicator (CDI)*
6. *Rotating Compass Card*
7. *OBS Mode Active*
8. *To/From Indicator*
9. *Heading Bug*
10. *Course Pointer*
11. *Flight Phase*
12. *Turn Rate and Heading Trend Vector*
13. *Current Heading*
14. *Lubber Line*

Figure 2-14 Horizontal Situation Indicator (360° HSI)

The Arc HSI (Figure 2-15) is a 140° expanded section of the compass rose. The Arc HSI contains a Course Pointer, To/From Indicator, a sliding deviation indicator (the To/From and deviation indicators are combined), and a deviation scale. Upon station passage, the To/From Indicator flips and points to the tail of the aircraft, just like a conventional To/From flag. Depending on the navigation source, the CDI on the Arc HSI can appear in two different ways: an arrowhead (GPS, VOR, OBS) or a diamond (LOC).

Figure 2-15 Arc HSI

HEADING AND COURSE INDICATIONS

NOTE: *See the AFCS Section for more information on Selected Heading functions.*

A digital reading of the current magnetic heading appears on top of the HSI. The heading displayed on the HSI is always magnetic, even if the Navigation Angle (NAV ANGLE) is set to 'True' on the AUX - System Setup Page on the MFD (see the System Overview for details).

When the pilot selects a course by rotating the **CRS** Knob, a digital reading appears for 3 seconds in a box to the right of the lubber line, next to the HSI. While the HSI is displayed as an arc, the Selected Course is displayed whenever the Course Pointer is not within the 140° currently shown Pressing the **CRS** Knob displays the digital reading, re-centers the CDI, and returns the course pointer pointing to the bearing of the active waypoint or navigation station (see OBS Mode for information on adjusting a GPS course).

When the pilot selects a heading by rotating the **HDG** Knob, a digital reading appears for 3 seconds in a box to the left of the lubber line, next to the HSI. A rotatable heading bug marks the desired heading on the HSI. While the HSI is displayed as an arc, if the Selected Heading Bug is adjusted off the shown portion of the compass rose, the digital reading displayed. This Selected Heading Bug and the current aircraft heading can be synchronized by pressing the **HDG** Knob, which moves the bug to the current heading.

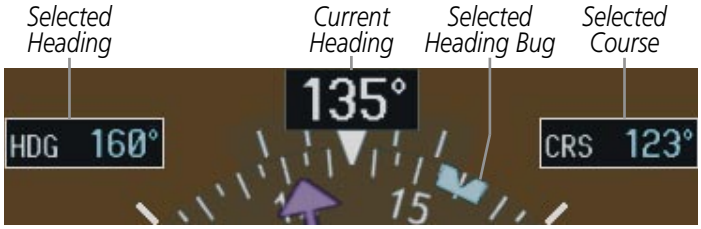


Figure 2-16 Heading and Course Indications

TURN RATE INDICATOR

The Turn Rate Indicator is located directly above the rotating compass card. Tick marks to the left and right of the lubber line denote half-standard and standard turn rates. A magenta Turn Rate Trend Vector shows the current turn rate. The end of the trend vector gives the heading predicted in 6 seconds, based on the present turn rate. At rates greater than 4 deg/sec, an arrowhead appears at the end of the magenta trend vector and the prediction is no longer valid (Figure 2-17).

A standard-rate turn is shown on the indicator by the trend vector stopping at the standard turn rate tick mark, corresponding to a predicted heading of 18° from the current heading (Figure 2-18).

Figure 2-17 Turn Rate Indicator and Trend Vector

Figure 2-18 Standard-Rate Turn Indication

NAVIGATION SOURCE

The HSI can display two sources of navigation: GPS or NAV (VOR, localizer, and glideslope). The **CDI** Softkey cycles through the navigation sources. Color indicates the current navigation source: magenta (for GPS) or green (for VOR and LOC).

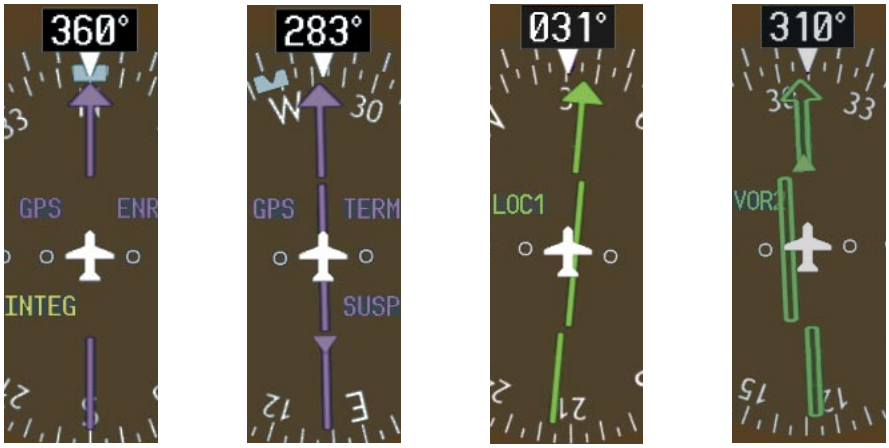


Figure 2-19 Navigation Sources with Example HSI Annunciations

Changing navigation sources:

1) Press the **CDI** Softkey to change from GPS to VOR1 or LOC1. The light blue tuning box is placed over the NAV1 standby frequency in the upper left corner of the PFD.
2) Press the **CDI** Softkey again to change from VOR1 or LOC1 to VOR2 or LOC2. The light blue tuning box is placed over the NAV2 standby frequency.
3) Press the **CDI** Softkey a third time to return to GPS.

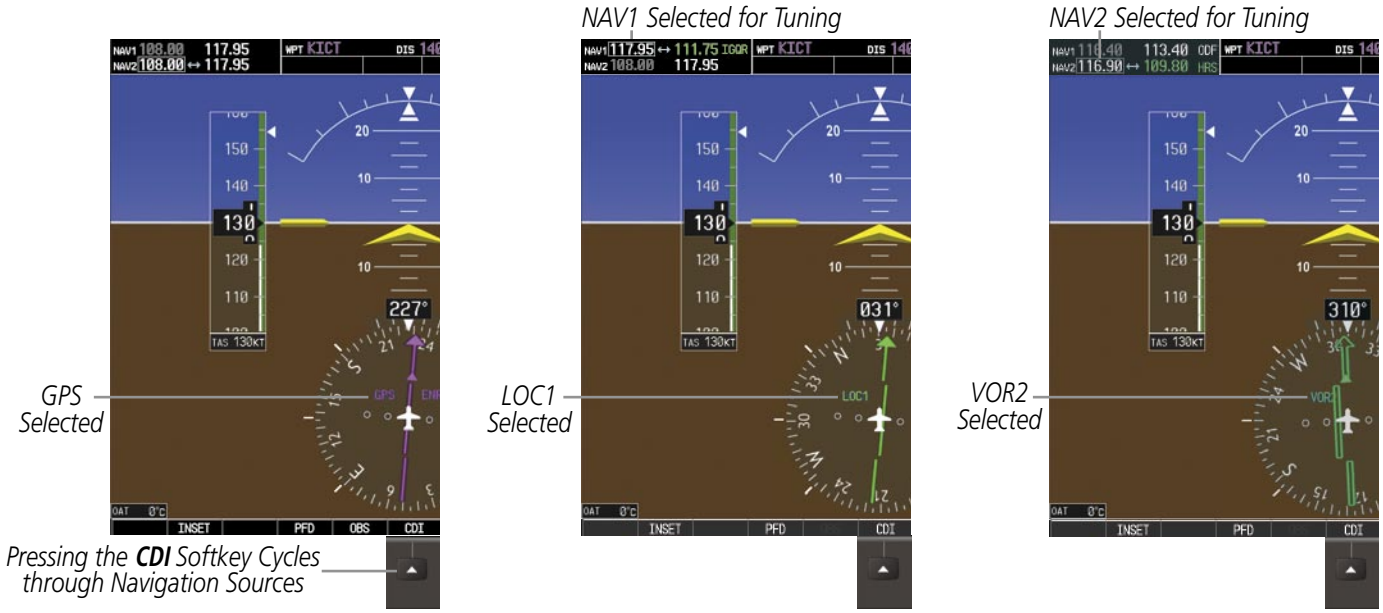


Figure 2-20 Selecting a Navigation Source

The following annunciations appear in yellow on the HSI to indicate abnormal GPS conditions:

- 'INTEG': Loss of Integrity–GPS integrity is insufficient for the current phase of flight
- 'WARN': GPS position error

Automatic Navigation Source Switching

On the AUX - System Setup Page, 'ILS CDI Capture' may be changed to 'Manual'. In 'Auto' (default) setting, the system automatically switches from GPS to LOC navigation source and changes the CDI scaling accordingly when:

- A localizer or ILS approach has been loaded into the active flight plan
- The final approach fix (FAF) is the active leg, the FAF is less than 15 nm away, and the aircraft is moving toward the FAF
- A valid localizer frequency has been tuned
- The GPS CDI deviation is less than 1.2 times full-scale deflection

GPS steering guidance is still provided after the HSI automatically switches to LOC until LOC capture, up to the Final Approach Fix (FAF) for an ILS approach, or until GPS information becomes invalid. Activating Vector-to-Final (see the GPS Navigation Section) also causes the HSI to switch to LOC navigation source, although the change is not considered automatic to the system and GPS steering guidance is not provided after this switch.

Changing the ILS CDI Capture setting:

1) Use the **FMS** Knob to select the AUX - System Setup Page on the MFD.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the 'ILS CDI Capture' field in the 'GPS CDI' Box (Figure 2-21).
4) Turn the small **FMS** Knob to highlight the desired setting and press the **ENT** Key.

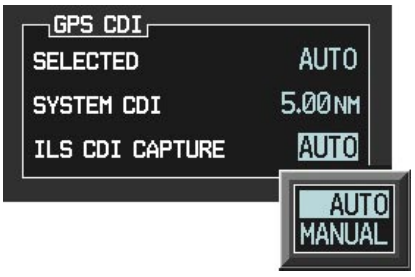


Figure 2-21 System Setup Page, ILS CDI Capture Setting

OBS Mode

Enabling Omni-bearing Selector (OBS) Mode (with the **OBS** Softkey) suspends the automatic sequencing of waypoints in a GPS flight plan (GPS must be the selected navigation source), but retains the current "active-to" waypoint as the navigation reference even after passing the waypoint. 'OBS' is annunciated to the lower right of the aircraft symbol when OBS Mode is selected (see Figure 2-22). When OBS is disabled (the **OBS** Softkey is pressed again), the GPS returns to normal operation, with automatic sequencing of waypoints. OBS mode also allows a desired course to/from a waypoint to be set (with a **CRS** Knob); pressing the **CRS** Knob re-centers the CDI and returns the course pointer to the waypoint bearing.

Enabling/disabling OBS Mode while navigating with GPS:

1) Press the **OBS** Softkey to select OBS Mode.
2) Turn the **CRS** Knob to select the desired course to/from the waypoint.
3) Press the **OBS** Softkey again to return to normal operation.

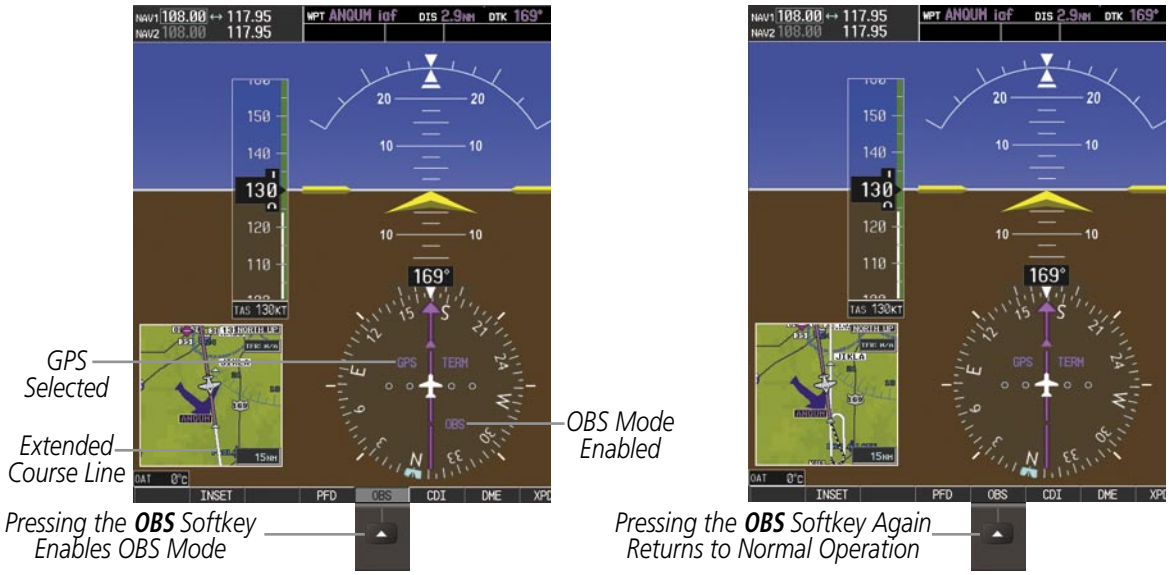

GPS Selected
Extended Course Line
OBS Mode Enabled
Pressing the OBS Softkey Enables OBS Mode
Pressing the OBS Softkey Again Returns to Normal Operation

Figure 2-22 Omni-bearing Selector (OBS) Mode

As the aircraft crosses the missed approach point (MAP), automatic approach waypoint sequencing is suspended. 'SUSP' appears on the HSI (to the lower right of the aircraft symbol) in place of 'OBS' and the **OBS** Softkey label changes to **SUSP**. Selecting the **SUSP** Softkey resumes automatic of approach waypoints.

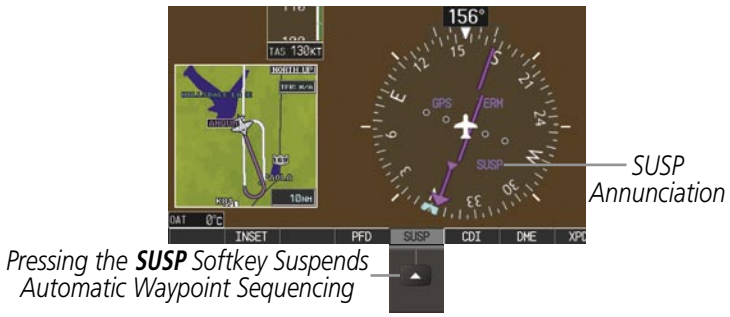


Figure 2-23 Suspending Automatic Waypoint Sequencing

COURSE DEVIATION INDICATOR

NOTE: *If the pilot makes a heading change greater than 105˚ with respect to the course, the CDI on the Arc HSI switches to the opposite side of the deviation scale and displays reverse sensing.*

The Course Deviation Indicator (CDI) moves left or right from the course pointer along a lateral deviation scale to display aircraft position relative to the course.

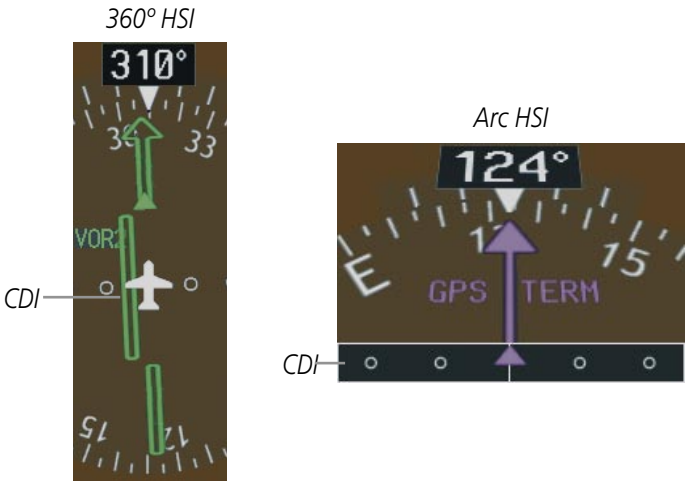


Figure 2-24 Course Deviation Indicator

The CDI has the same angular limits as a mechanical CDI when coupled to a VOR or LOC. When coupled to GPS, the full scale limits for the CDI are defined by a GPS-derived distance (5.0, 1.0, or 0.3 nm). The current GPS CDI scale setting is displayed as 'System CDI' on the AUX - System Setup Page, and the scale setting may also be changed (5.0 nm, 1.0 nm, 0.3 nm, or Auto) from this page (Figure 2-25). When set to 'Auto' (default), the CDI scale automatically adjusts to the desired limits based upon the current phase of flight:

- Leaving the departure airport the CDI scale is set to 1.0 nm and gradually ramps up to 5.0 nm beyond 30 nm from the departure airport
- The CDI scale is set to 5.0 nm during the enroute phase of flight
- Within 30 nm of the destination airport, the CDI scale gradually ramps down to 1.0 nm (terminal area)
- During approach operations, the CDI scale ramps down even further to 0.3 nm. This transition normally occurs within 2.0 nm of the final approach fix (FAF).

If a lower CDI scale setting is selected (1.0 or 0.3 nm), the higher scale settings are not selected during any phase of flight and the selected setting is displayed instead of the flight phase annunciation. For example, if 1.0 nm is selected, the G1000 uses this for enroute and terminal phases and ramps down to 0.3 nm during an approach. Receiver Autonomous Integrity Monitoring (RAIM) protection limits follow the selected CDI scale and corresponding flight phases.

Changing the GPS CDI settings:

1) Use the **FMS** Knob to select the AUX - System Setup Page on the MFD.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the 'Selected' field in the 'GPS CDI' box.
4) Turn the small **FMS** Knob to highlight the desired setting and press the **ENT** Key.

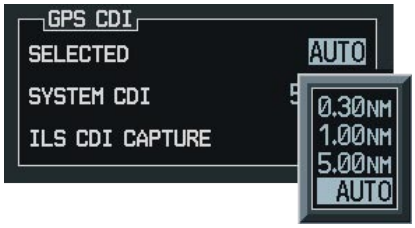


Figure 2-25 System Setup Page, GPS CDI Settings

BEARING POINTERS AND INFORMATION WINDOWS

NOTE: *When the Arc HSI is displayed, the Bearing Information windows and pointers are disabled.*

NOTE: *Refer to the Audio Panel and CNS Section for information on tuning the radios.*

Two bearing pointers and associated information (Figure 2-22) can be displayed on the HSI for NAV, GPS, and ADF sources. The pointers are light blue and are single- (BRG1) or double-lined (BRG2); an icon is shown in the respective information window to indicate the pointer type. The bearing pointers never override the CDI and are visually separated from the CDI by a white ring (shown even when bearing pointers are selected but not necessarily visible due to data unavailability).

When a bearing pointer is displayed, its associated information window is also displayed. The Bearing Information windows (Figure 2-26) are displayed to the lower sides of the HSI and show:

- Bearing source (NAV, GPS, ADF)
- Pointer icon (single line for BRG1, double line for BRG2)
- Frequency (NAV, ADF)
- Station/waypoint identifier (NAV, GPS)
- GPS-derived great circle distance to bearing source

If the NAV radio is the selected bearing source and is tuned to an ILS frequency, the bearing pointer is removed from the HSI and the frequency is replaced with "ILS". If the NAV radio is not receiving the tuned VOR station, the bearing pointer is removed from the HSI and the frequency displayed in the information window is replaced with "NO DATA". When NAV1 or NAV2 is the selected bearing source, the frequency is replaced by the station identifier when the station is within range.

If GPS is the selected bearing source, the active waypoint identifier is displayed in lieu of a frequency. If an active waypoint is not selected, the bearing pointer is removed from the HSI and "NO DATA" is displayed in the information window.

Selecting bearing display and changing sources:

1) Press the **PFD** Softkey.
2) Press a **BRG** Softkey to display the desired bearing pointer and information window with a NAV source.
3) Press the **BRG** Softkey again to change the bearing source to GPS.
4) Press the **BRG** Softkey a third time to change the bearing source to ADF (note: ADF radio installation is optional).
5) To remove the bearing pointer and information window, press the **BRG** Softkey again.

DME INFORMATION WINDOW

NOTE: *Refer to the Audio Panel and CNS Section for information on tuning the radios.*

NOTE: *DME radio installation is optional.*

The DME Information Window is displayed above the BRG1 Information Window and shows the DME label, tuning mode (NAV1, NAV2, or HOLD), frequency, and distance. When a signal is invalid, the distance is replaced by "–.– – NM".

Displaying the DME Information Window:

1) Press the **PFD** Softkey.
2) Press the **DME** Softkey to display the DME Information Window above the BRG1 Information Window.
3) To remove the DME Information Window, press the **DME** Softkey again.

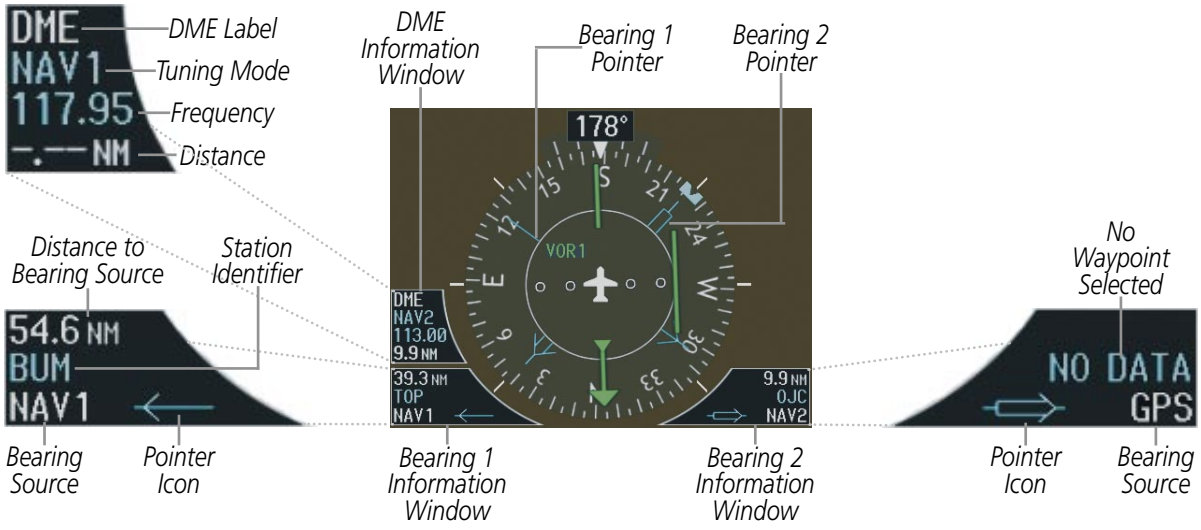


Figure 2-26 HSI with Bearing and DME Information

2.3 SUPPLEMENTAL FLIGHT DATA

NOTE: *Pressing the **DFLTS** Softkey (a second-level PFD softkey) turns off metric Altimeter display and the Inset Map. Pressing this softkey does not restore display units to the default settings.*

Some displayed information disappears when pitch exceeds +30°/-20° or bank exceeds 65°. The Altimeter and Airspeed, Attitude, Vertical Speed, and Horizontal Situation indicators remain on the display and the Bearing Information and Annunciation windows can be displayed during such situations.

The following information is removed from the PFD (and corresponding softkeys are disabled) when the aircraft experiences unusual attitudes:

- Traffic Annunciations
- AFCS Annunciations
- Flight director Command Bars
- Inset Map
- Outside Air Temperature
- DME Information Window
- Transponder Data Box
- System Time
- PFD Setup Menu
- Windows displayed in the lower right corner
- Barometric Minimum Descent Altitude Box
- Vertical Deviation/Glideslope Indicator
- Altimeter Barometric Setting
- Selected Altitude

TIMER/REFERENCES WINDOW

NOTE: *Refer to Section 2.2 under the Airspeed Indicator discussion for information on Vspeeds and Section 2.4 for information on the barometric minimum descent altitude.*

The Timer/References Window is enabled/disabled in the lower right corner of the PFD by pressing the **TMR/REF** Softkey. This window provides access to the following settings:

- Generic Timer
- Vspeed values and flags
- Barometric minimum descent altitude (MDA, DH)

Figure 2-27 Timer/References Window

GENERIC TIMER

The PFD generic timer can be set to count up or down from a specified time (HH:MM:SS). When the countdown on the timer reaches zero, the digits begin to count up from zero. If the timer is reset before reaching zero on a countdown, the digits are reset to the initial value. If the timer is counting up when reset, the digits are zeroed.

Setting the generic timer:

1) Press the **TMR/REF** Softkey.
2) Turn the large **FMS** Knob to select the time field (hh/mm/ss).
3) Use the **FMS** Knob to enter the desired time and press the **ENT** Key.
4) With the UP/DN field highlighted, turn the small **FMS** Knob to select the timer counting direction.
5) Press the **ENT** Key.
6) With 'START?' highlighted, press the **ENT** Key to start the timer. The field changes to 'STOP?'.
7) To stop the timer, press the **ENT** Key with 'STOP?' highlighted. The field changes to 'RESET?'.
8) To reset the timer, press the **ENT** Key with 'RESET?' highlighted. The field changes back to 'START?' and the digits are reset.
9) To remove the window, press the **CLR** Key or the **TMR/REF** Softkey.

OUTSIDE AIR TEMPERATURE

The outside air temperature (OAT) is displayed in degrees Celsius (°C) by default in the lower left of the PFD under normal display conditions, or below the true airspeed in reversionary mode.

Figure 2-28 Outside Air Temperature

Changing temperature display units:

1) Select the AUX - System Setup Page using the **FMS** Knob.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the 'Temp' field (Figure 2-30).
4) Turn the small **FMS** Knob to select the desired unit.
5) Press the **ENT** Key to confirm selection.

SYSTEM TIME

The system time is displayed in the lower right corner of the PFD. Three display formats are available, local 12-hr, local 24-hr, and Coordinated Universal Time (UTC). Time and date are obtained from the GPS satellites and cannot be changed, although a time offset may be entered (±HH:MM) for local times.

Figure 2-29 System Time

Configuring the system time:

1) Select the AUX - System Setup Page using the **FMS** Knob.
2) Press the **FMS** Knob to activate the cursor.
3) Turn the large **FMS** Knob to highlight the 'Time Format' field (Figure 2-31).
4) Turn the small **FMS** Knob to select the desired format and press the **ENT** Key to confirm selection. The 'Time Offset' field is highlighted.
5) Use the **FMS** Knob to enter the desired time offset (±HH:MM) and press the **ENT** Key to confirm selection.

Figure 2-30 System Setup Page, Display Units Settings

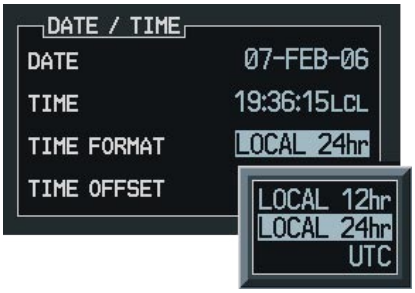


Figure 2-31 System Setup Page, Date/Time Settings

2.4 PFD ANNUNCIATIONS AND ALERTING FUNCTIONS

NOTE: For a detailed description of annunciations and alerts, refer to Appendix A.

SOFTKEY ANNUNCIATIONS

The **ALERTS** Softkey label changes to display the appropriate annunciation when an alert is issued. The annunciation flashes and the appropriate aural alert sounds until acknowledged by pressing the softkey. The softkey then reverts to the **ALERTS** label, and when pressed again opens the Alerts Window to display a descriptive message of the alert.

Warnings are time-critical and require immediate pilot attention. A flashing **WARNING** Softkey annunciation and aural tone (single chime every two seconds) are used to alert the pilot of any warnings. The aural tone and flashing **WARNING** annunciator continue until acknowledged by the pilot (by pressing the **WARNING** Softkey).

Caution indicates the existence of abnormal conditions on the aircraft that may require pilot intervention. A flashing **CAUTION** Softkey annunciation and single aural tone (one chime) are used to alert the pilot of any cautions. The flashing **CAUTION** annunciator continues to flash until acknowledged by the pilot (by pressing the **CAUTION** Softkey).

An advisory provides general information to the pilot that may not need immediate attention. A flashing **ADVISORY** Softkey annunciation (no aural tone) is used to alert the pilot of any message advisories. The flashing **ADVISORY** annunciator continues to flash until acknowledged by the pilot (by pressing the **ADVISORY** Softkey).

Figure 2-32 Softkey Annunciation (ALERTS Softkey labels)

ALERTS WINDOW

Messages appear in the Alerts Window (in the lower right corner of the PFD; Figure 2-33) when a warning, caution, advisory alert, or G1000 message advisory occurs. System alert messages are provided to make the pilot aware of G1000 system problems or status and may not require pilot action. The Alerts Window allows system alerts to be displayed simultaneously. The **FMS** Knob can be used to scroll through the alert messages. The Alerts Window is enabled/disabled by pressing the **ALERTS** Softkey. If the window is already open when a new message is generated, pressing the **ALERTS** Softkey to acknowledge the message causes it to turn gray.

ANNUNCIATION WINDOW

The Annunciation Window appears to the right of the Vertical Speed Indicator and displays abbreviated annunciation text for aircraft alerts. Text color is based on alert level: warnings appear in red, cautions in yellow, advisory alerts in white. New alerts, regardless of priority, are displayed at the top of the Annunciation Window, separated by a white line from acknowledged alerts. Once acknowledged, they are sequenced based on priority.

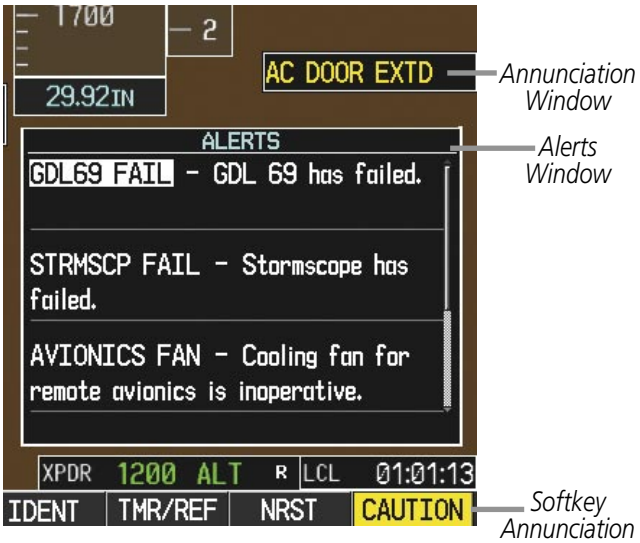


Figure 2-33 G1000 Alerting System

ALTITUDE ALERTING

The Altitude Alerting function provides the pilot with a visual alert when approaching the Selected Altitude. Whenever the Selected Altitude is changed, the Altitude Alerter is reset. The Altitude Alerter is independent of the GFC 700 AFCS. The following occurs when approach the Selected Altitude:

- Upon passing through 1000 feet of the Selected Altitude, the Selected Altitude (shown above the Altimeter) changes to black text on a light blue background and flashes for five seconds.
- When the aircraft passes within 200 feet of the Selected Altitude, the Selected Altitude changes to light blue text on a black background, flashes for five seconds, and an aural tone is generated.
- After reaching the Selected Altitude, if the pilot flies outside the deviation band (±200 feet of the Selected Altitude), the Selected Altitude changes to yellow text on a black background, flashes for five seconds, and an aural tone is generated.

Figure 2-34 Altitude Alerting Visual Annunciations

MARKER BEACON ANNUNCIATIONS

Marker Beacon Annunciations are displayed on the PFD to the left of the Selected Altitude. Outer marker reception is indicated in blue, middle in yellow, and inner in white. Refer to the Audio Panel and CNS Section for more information on Marker Beacon Annunciations.

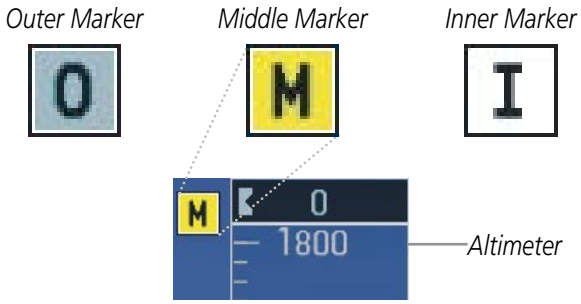


Figure 2-35 Marker Beacon Annunciations

TRAFFIC ANNUNCIATION

The G1000 System displays traffic symbolically on the Inset Map (PFD), the Navigation Map Page (MFD), and various other MFD page maps. Refer to the Hazard Avoidance Section and Appendix E for more details about the Traffic Information Service (TIS) and optional Traffic Advisory Systems (TAS). When a traffic advisory (TA) is detected, the following automatically occurs:

- The PFD Inset Map is enabled and displays traffic
- A flashing black-on-yellow 'TRAFFIC' annunciation (Figure 2-39) appears to the top left of the Attitude Indicator for five seconds and remains displayed until no TAs are detected in the area
- A single "TRAFFIC" aural alert is generated, unless an optional Traffic Advisory System (TAS) is installed (refer to the applicable TAS documentation for alerts generated by TAS equipment)

  If additional TAs appear, new aural and visual alerts are generated.

TAWS ANNUNCIATIONS

Terrain Awareness and Warning System (TAWS) annunciations appear on the PFD to the upper left of the Altimeter (also where the Marker Beacon Annunciations appear). Refer to the Hazard Avoidance Section and Appendix A for information on TAWS alerts and annunciations.

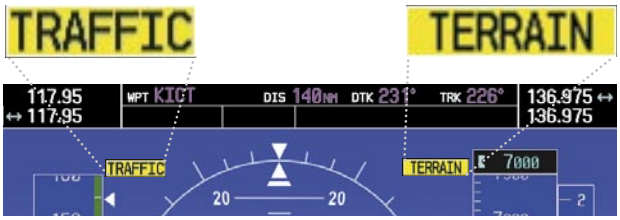


Figure 2-36 Traffic and Example TAWS Annunciations

BAROMETRIC MINIMUM DESCENT ALTITUDE

For altitude awareness, a barometric minimum descent altitude (MDA, or decision height, DH) can be set in the Timer/References Window. When active, the MDA is displayed in a window labeled 'BARO MIN' to the lower left of the Altimeter and on the altitude tape with a bug (once the altitude is within the range of the tape). This altitude can be adjusted in the 'Baro Min' field in the Timer/References Window (Figure 2-37) from zero to 16,000 feet (in 10-ft increments with the small **FMS** Knob). The MDA is reset any time the power is cycled.

Setting the barometric minimum descent altitude and bug:

1) Press the **TMR/REF** Softkey.
2) Turn the large **FMS** Knob to highlight the 'Baro Min' field (Figure 2-37).
3) Use the small **FMS** Knob to enter the desired altitude (in 10-ft increments from zero to 16,000 feet) and press the **ENT** Key.
4) In the highlighted ON/OFF field, turn the small **FMS** Knob clockwise to ON or counterclockwise to OFF.
5) To remove the window, press the **CLR** Key or the **TMR/REF** Softkey.

Figure 2-37 Barometric Minimum Descent Altitude

Visual annunciations alert the pilot when approaching the MDA (Figure 2-38):

- When the aircraft altitude descends to within 2500 feet of the MDA setting, the 'BARO MIN' Window appears with the altitude in light blue text. Once in range, the bug appears on the tape in light blue.
- When the aircraft passes through 100 feet of the MDA, the bug and text turn white.
- Once the aircraft descends past the MDA, the bug and text turn yellow and the aural alert, "Minimums Minimums", is generated.

Alerting is inhibited while the aircraft is on the ground and until the aircraft reaches 150 feet above the MDA. If the aircraft proceeds to climb after having reached the MDA, once it reaches 50 feet above the MDA, alerting is disabled.

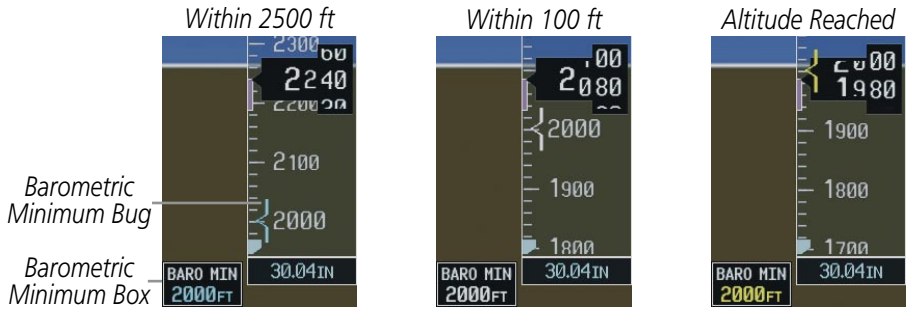


Figure 2-38 Barometric Minimum Descent Altitude Alerting Visual Annunciations

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SECTION 3 ENGINE INDICATION SYSTEM (EIS)

3.1 INTRODUCTION

NOTE: *Refer to the Pilot's Operating Handbook (POH) for limitations.*

The G1000 Engine Indication System (EIS) for the Beechcraft A36/G36 displays critical engine, electrical, fuel, and other system parameters on the left side of the Multi Function Display (MFD) during normal operations. In Reversionary Mode, the display unit is re-configured to present Primary Flight Display (PFD) symbology together with the EIS (refer to the System Overview for information about Reversionary Mode).

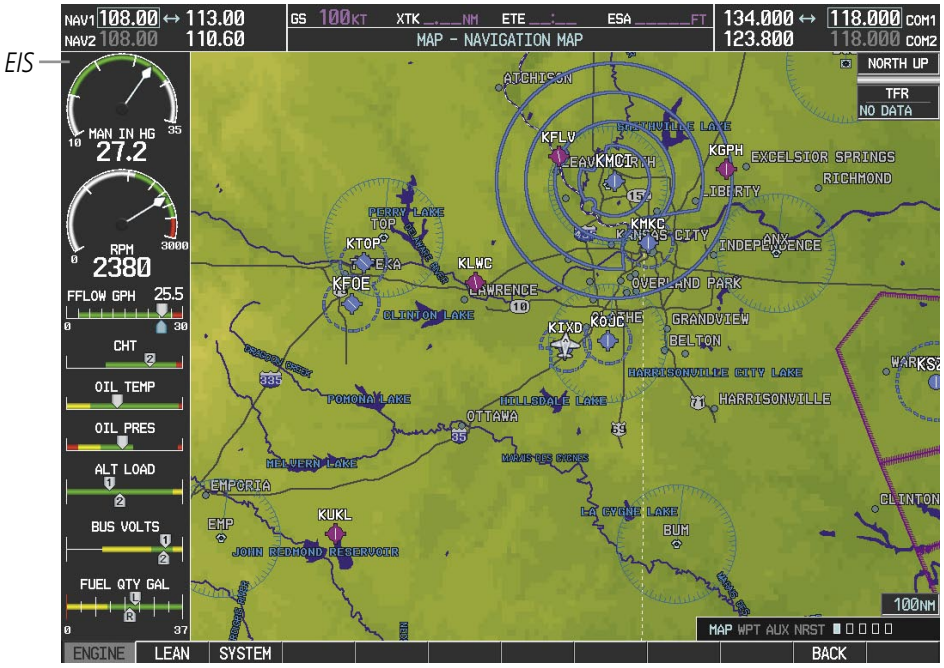

Figure 3-1 Multi Function Display

EIS information is presented in three displays, accessed using the **ENGINE** Softkey on the MFD:

- **Engine Display –** Default display, shows all critical engine, fuel, and electrical indicators
- **Lean Display –** Provides engine leaning information
- **System Display –** Shows numeric readouts of critical engine, fuel, and electrical indications

The Engine Manifold Pressure Gauge and Tachometer are present at the top of all three displays.

The EIS instrument types include gauges, horizontal bar indicators, bar graphs, and numeric readouts. Green bands indicate normal ranges of operation; yellow and red bands indicate caution and warning, respectively. Pointers, bars, and readouts appear in white to indicate normal operation and change to yellow or red when parameters are in caution or warning ranges. If sensory data to an instrument becomes invalid or unavailable, a red "X" is shown across the instrument. The EIS automatically switches to the default Engine Display when certain parameters are exceeded while showing one of the other EIS displays.

3.2 ENGINE DISPLAY

NOTE: *Refer to the POH for limitations regarding fuel quantity.*

The Engine Display is the default EIS display and can be selected by pressing the **ENGINE** or **BACK** Softkey when another EIS display is currently shown. Beneath the dial gauges are horizontal bar indicators for fuel flow, cylinder head temperature, oil temperature and pressure, alternator load, bus voltage, and fuel quantity.

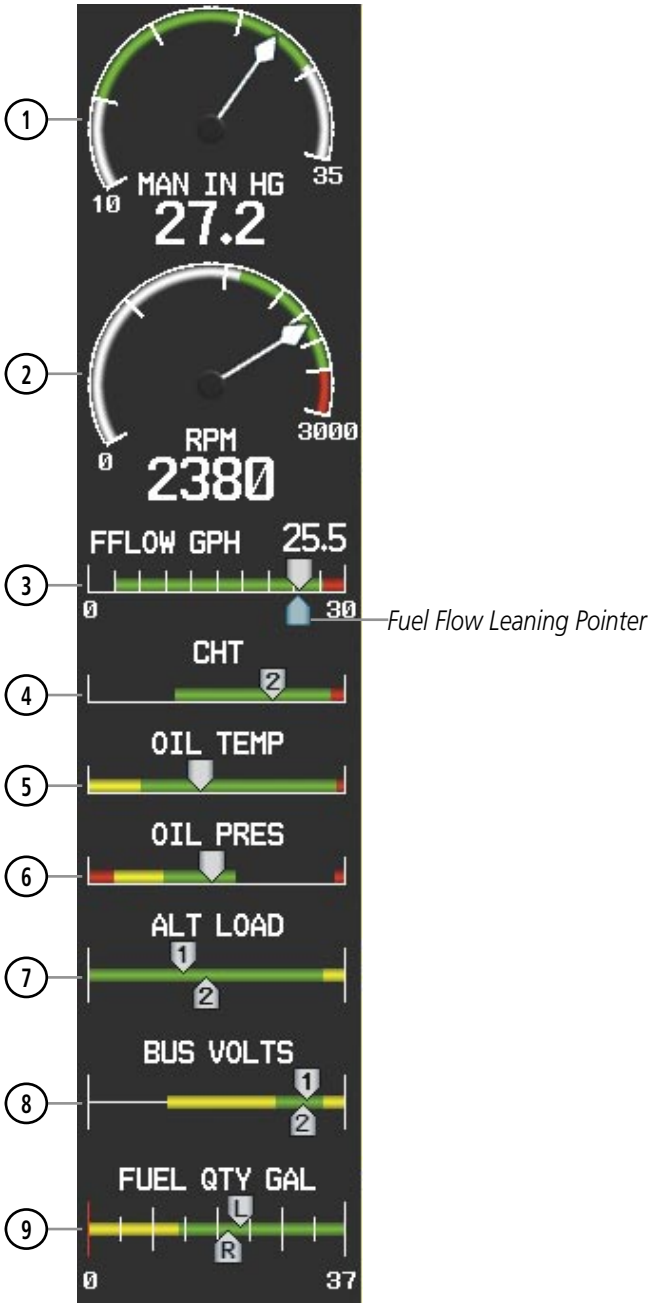

Figure 3-2 Engine Display

1	**Engine Manifold Pressure Gauge (MAN IN HG)**	Displays engine power in inches of Mercury (in Hg)
2	**Tachometer (RPM)**	Shows propeller speed in revolutions per minute (rpm); the red area indicates propeller overspeed
3	**Fuel Flow Indicator (FFLOW GPH)**	Displays current fuel flow in gallons per hour (gph) *Normally-aspirated aircraft only*: A Fuel Flow Leaning Pointer provides a leaning reference for the pilot during a cruise or max power climb (MPC). The pointer is displayed below the Fuel Flow Indicator if the propeller speed exceeds 2530 rpm or fuel flow exceeds a specified value based on altitude during a cruise climb or MPC.
4	**Cylinder Head Temperature Indicator (CHT)**	The pointer, displaying the cylinder number, shows the highest Cylinder Head Temperature (CHT) along a horizontal bar indicator
5	**Oil Temperature Indicator (OIL TEMP)**	Oil temperature is shown along a horizontal bar indicator
6	**Oil Pressure Indicator (OIL PRES)**	Oil pressure is displayed along a horizontal bar indicator
7	**Ammeter (ALT LOAD)**	Displays current loads for alternators 1 and 2
8	**Voltmeter (BUS VOLTS)**	Displays the primary bus voltages for buses 1 and 2
9	**Fuel Quantity Indicator (FUEL QTY GAL)**	Displays the amount of fuel in gallons (gal) for each tank (L and R)

3.3 LEAN DISPLAY

NOTE: The pilot should follow the engine manufacturer's recommended leaning procedures in the POH.

The Lean Display is accessed by pressing the **ENGINE** Softkey followed by the **LEAN** Softkey. Engine temperature parameters are shown to provide assistance during engine leaning.

Bars for cylinders whose exhaust gas and head temperatures are within the normal range are shown in white. On the CHT Bar Graph, caution or warning conditions for each cylinder are indicated by color change of the bar to yellow or red, respectively. By default, the cylinder with the hottest EGT and CHT is selected (bar indicated in light blue) when the **LEAN** Softkey is pressed. The readouts below the bar graphs correspond to the selected cylinder.

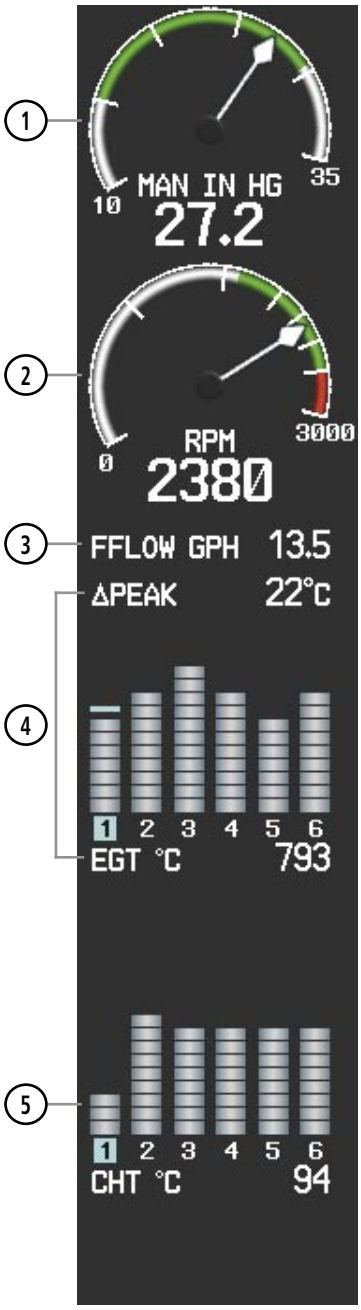

Figure 3-3 Lean Display

1	**Engine Manifold Pressure Gauge (MAN IN HG)**	Displays engine power in inches of Mercury (in Hg)
2	**Tachometer (RPM)**	Shows propeller speed in revolutions per minute (rpm); the red area indicates propeller overspeed
3	**Fuel Flow (FFLOW GPH)**	Displays current fuel flow in gallons per hour (gph)
4	**Exhaust Gas Temperature Bar Graph (EGT °F)**	The number of the cylinder with the highest Exhaust Gas Temperature (EGT) is highlighted in light blue and its readout given below the bar graph in degrees Celsius (°C). A light blue mark appears to represent the peak EGT for the selected cylinder when the **ASSIST** Softkey is pressed
5	**Cylinder Head Temperature Bar Graph (CHT °F)**	The number of the cylinder with the highest head temperature is highlighted in light blue and its readout given below the bar graph in degrees Celsius (°C). A caution or warning condition is denoted by color change of a cylinder's bar to yellow or red, respectively.

While the EIS Lean Display is selected, the **CYL SLCT** Softkey can be pressed to obtain information about a particular cylinder on both the EGT and CHT graphs. The selected cylinder is highlighted in light blue. The **CYL SLCT** Softkey is disabled during warning or caution conditions or when the **ASSIST** Softkey is pressed.

The **ASSIST** Softkey may be used to assist in the leaning process by identifying the EGT peak (shown as a light blue bar) of the selected cylinder. Pressing this softkey causes the EGT deviation from peak (Δ PEAK) to be displayed under the fuel flow readout. The system automatically switches to the first peak obtained.

Accessing the EIS Lean Display:

1) Press the **ENGINE** Softkey.
2) Press the **LEAN** Softkey.
3) To return to the default Engine Display, press the **ENGINE** or **BACK** Softkey.

Monitoring the desired cylinder's EGT and CHT:

From the Lean Display, press the **CYL SLCT** Softkey to cycle through each cylinder and view its EGT and CHT. The selected cylinder is shown in light blue.

Selecting the Engine Leaning Assist function:

From the Lean Display, press the **ASSIST** Softkey to identify the peak. The peak temperature for the selected cylinder is indicated with a hollow block on the EGT Bar Graph and the temperature deviation from peak is shown underneath the EGT Bar Graph.

3.4 SYSTEM DISPLAY

NOTE: *Fuel calculations do not use the aircraft Fuel Quantity Indicator and are calculated from the last time the fuel was reset.*

NOTE: *Refer to the POH for limitations.*

The System Display is accessed by pressing the **ENGINE** Softkey followed by the **SYSTEM** Softkey. Readouts below the Engine Manifold Pressure Gauge and Tachometer are grouped into three categories: System (Oil), Fuel Calculations, and Electrical.

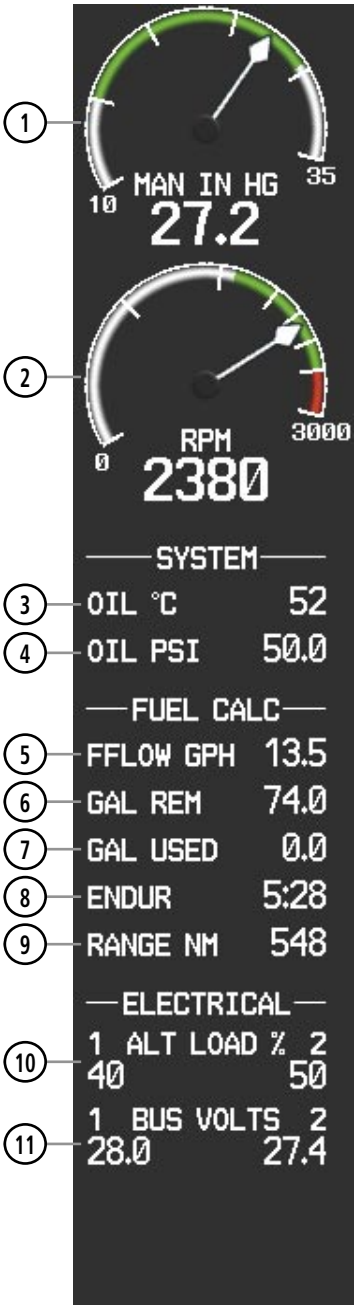

Figure 3-4 System Display

1	**Engine Manifold Pressure Gauge (MAN IN)**	Displays engine power in inches of Mercury (in Hg)
2	**Tachometer (RPM)**	Shows propeller speed in revolutions per minute (rpm); the red area indicates propeller overspeed
3	**Oil Temperature (OIL °C)**	Oil temperature is shown in degrees Celsius (°C)
4	**Oil Pressure (OIL PSI)**	Oil pressure is displayed in pounds per square inch (psi)
5	**Fuel Flow (FFLOW GPH)**	Displays fuel flow in gallons per hour (gph)
6	**Calculated Fuel Remaining (GAL REM)**	Shows the totalizer-based fuel remaining in gallons, adjusted by the pilot using the FUEL softkeys
7	**Calculated Fuel Used (GAL USED)**	Shows the fuel used in gallons, based on fuel flow
8	**Calculated Endurance (ENDUR)**	Shows the calculated endurance in hours:minutes (HH:MM)
9	**Calculated Range (RANGE NM)**	Shows the calculated range in nautical miles (nm)
10	**Ammeter (ALT LOAD)**	Displays loads for alternators 1 and 2 in amperes
11	**Voltmeter (BUS VOLTS)**	Displays the primary bus voltages for buses 1 and 2

Fuel calculations are based on the fuel flow totalizer and the displayed fuel remaining (GAL REM), adjusted by the pilot using the following softkeys:

- **DEC FUEL** – Decreases totalizer-based fuel remaining in one-gallon increments
- **INC FUEL** – Increases totalizer-based fuel remaining in one-gallon increments
- **RST FUEL** – Resets totalizer-based fuel remaining to the aircraft's fuel capacity

Accessing the EIS System Display:

1) Press the **ENGINE** Softkey.
2) Press the **SYSTEM** Softkey.
3) To return to the default Engine Display, press the **ENGINE** or **BACK** Softkey.

Adjusting the fuel totalizer quantity:

From the System Display, press the **DEC FUEL** or **INC FUEL** Softkey to obtain the desired number of gallons remaining (GAL REM).

Resetting the fuel totalizer:

From the System Display, press the **RST FUEL** Softkey. This also resets the displayed fuel remaining (GAL REM) to zero.

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SECTION 4 AUDIO PANEL AND CNS

4.1 OVERVIEW

The Communication/Navigation/Surveillance (CNS) system includes the Audio Panel, communication radios, navigation radios, and Mode S transponder. The System Overview section provides a block diagram description of the Audio Panel and CNS system interconnection.

CNS operation in Beechcraft A36/G36 aircraft is performed by the following Line Replaceable Units (LRUs):

- GDU 1040 Primary Flight Display (PFD) and GDU 1042 Multi Function Display (MFD)
- GIA 63 Integrated Avionics Units (2)
- GMA 1347 Audio Panel
- GTX 33 Mode S Transponder

The PFD/MFD controls are used to tune the communication transceivers and navigation radios.

The Audio Panel provides the traditional audio selector functions of microphone and receiver audio selection. The Audio Panel includes an intercom system (ICS) between the pilot, copilot, and passengers, a marker beacon receiver, and a COM clearance recorder. Ambient noise from the aircraft radios is reduced by a feature called Master Avionics Squelch (MASQ). When no audio is detected, MASQ processing further reduces the amount of background noise from the radios.

The Mode S transponder is controlled with softkeys located on the Primary Flight Display (PFD) at the lower portion of the screen. The Transponder Data Box is located to the left of the System Time Box. The data box displays a four-digit code field, a mode field, and a reply status indicator (Figure 4-1).

PFD/MFD CONTROLS AND FREQUENCY DISPLAY

Figure 4-1 PFD/MFD Controls, COM/NAV Frequency Tuning Boxes, and DME Tuning Window (PFD Shown)

(1) **NAV VOL/ID Knob –** Controls NAV audio volume level. Press to turn the Morse code identifier audio on and off. Volume level is shown in the NAV frequency field as a percentage.

(2) **NAV Frequency Transfer Key –** Transfers the standby and active NAV frequencies.

(3) **NAV Knob –** Tunes the standby frequencies for the NAV receiver (large knob for MHz; small knob for kHz). Press to move the tuning box (light blue box) and Frequency Transfer Arrow between NAV1 and NAV2.

(4) **NAV Frequency Box –** Displays NAV standby and active frequency fields, volume, and station ID. The frequency of the NAV radio selected for navigation is displayed in green.

(5) **COM Frequency Box –** Displays COM standby and active frequency fields and volume. The selected COM transceiver frequency is displayed in green.

(6) **COM Knob –** Tunes the standby frequencies for the COM transceiver (large knob for MHz; small knob for kHz). Press to move the tuning box (light blue box) and Frequency Transfer Arrow between COM1 and COM2.

(7) **COM Frequency Transfer Key –** Transfers the standby and active COM frequencies. Press and hold this key for two seconds to tune the emergency frequency (121.500 MHz) automatically into the active frequency field.

(8) **COM VOL/SQ Knob –** Controls COM audio volume level. Press to turn the COM automatic squelch on and off. Volume level is shown in the COM frequency field as a percentage.

(9) **DME Tuning Window –** Displays DME frequency pairing mode. Display by pressing **DME** Softkey.

(10) **ENT Key –** Validates or confirms DME pairing mode and Auto-tune selection.

(11) **FMS Knob –** Flight Management System Knob, used to select DME modes and Auto-tune entries when DME Tuning Window or NRST Window is present. Press the **FMS** Knob to turn the selection cursor on and off. The large knob moves the cursor in the window. The small knob selects individual characters for the highlighted cursor location.

(12) **Transponder Data Box –** Indicates the selected transponder code, operating mode, reply, and ident status for the transponder.

AUDIO PANEL CONTROLS

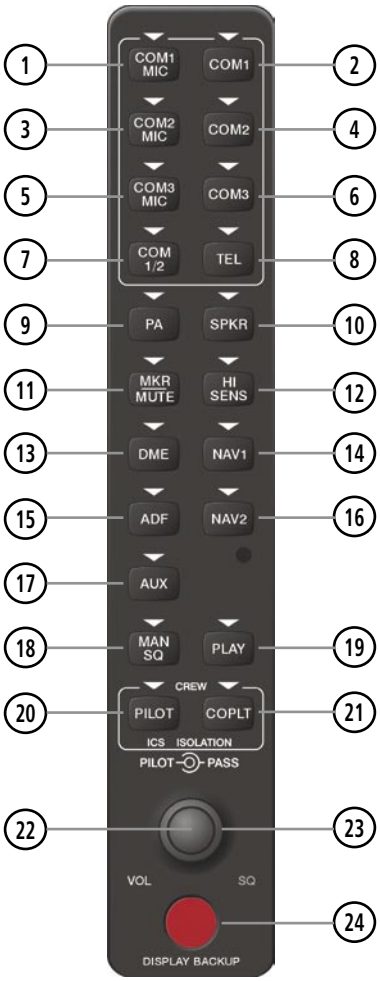


Figure 4-2 Audio Panel Controls (GMA 1347)

NOTE: *When a key is selected, a triangular annunciator above the key is illuminated.*

1. **COM1 MIC** – Selects the #1 transmitter for transmitting. COM1 receive is simultaneously selected when this key is pressed allowing received audio from the #1 COM receiver to be heard. COM2 receive can be added by pressing the **COM2** Key.
2. **COM1** – When selected, audio from the #1 COM receiver can be heard.
3. **COM2 MIC** – Selects the #2 transmitter for transmitting. COM2 receive is simultaneously selected when this key is pressed allowing received audio from the #2 COM receiver to be heard. COM1 receive can be added by pressing the **COM1** Key.
4. **COM2** – When selected, audio from the #2 COM receiver can be heard.
5. **COM3 MIC** – Not used in A36/G36 aircraft.

6. **COM3** – Not used in A36/G36 aircraft.
7. **COM 1/2** – Split COM Key. Allows simultaneous transmission on COM1 and COM2 by the pilot and copilot.
8. **TEL** – Not used in A36/G36 aircraft.
9. **PA** – Selects the passenger address system. The selected COM transmitter is deselected when the **PA** Key is pressed.
10. **SPKR** – Pressing this key selects and deselects the cabin speaker. COM and NAV receiver audio can be heard on the speaker.
11. **MKR/MUTE** – Selects Marker Beacon Receiver audio. Mutes the currently received Marker Beacon Receiver audio. Un-mutes automatically when new marker beacon audio is received. Also, stops play of recorded COM audio.
12. **HI SENS** – Press to increase Marker Beacon Receiver sensitivity. Press again to return to low sensitivity.
13. **DME** – Pressing turns the optional DME audio on or off.
14. **NAV1** – When selected, audio from the #1 NAV receiver can be heard.
15. **ADF** – Not used in A36/G36 aircraft.
16. **NAV2** – When selected, audio from the #2 NAV receiver can be heard.
17. **AUX** – Not used in A36/G36 aircraft.
18. **MAN SQ** – Press to enable manual squelch for the intercom. When active, press the **PILOT** Knob to illuminate 'SQ'. Turn the **PILOT/PASS** Knobs to adjust squelch.
19. **PLAY** – Press once to play the last recorded COM audio. Press again while audio is playing and the previous block of recorded audio will be played. Each subsequent press plays each previously recorded block. Pressing the **MKR/MUTE** Key during play of a memory block stops play.
20. **PILOT** – Pressing selects the pilot intercom isolation. Press again to deselect pilot isolation.
21. **COPLT** – Pressing selects the copilot intercom isolation. Press again to deselect copilot isolation.
22. **PILOT Knob** – Press to switch between volume and squelch control as indicated by the 'VOL' or 'SQ' being illuminated. Turn to adjust intercom volume or squelch. The **MAN SQ** Key must be selected to allow squelch adjustment.
23. **PASS Knob** – Turn to adjust Copilot/Passenger intercom volume or squelch. The **MAN SQ** Key must be selected to allow squelch adjustment.
24. **Reversionary Mode Button** – Pressing manually selects Reversionary Mode.

4.2 COM OPERATION

COM TRANSCEIVER SELECTION AND ACTIVATION

NOTE: *During PA Mode, the COM MIC annunciator is extinguished and the COM active frequency color is white, indicating that the COM transmitter is inactive.*

NOTE: *When turning on the G1000 for use, the system remembers the last frequencies used and the active COM transceiver state prior to shutdown.*

The COM Frequency Box is composed of four fields; the two active frequencies are on the left side and the two standby frequencies are on the right.

The COM transceiver is selected for transmitting by pressing the **COM MIC** Keys on the Audio Panel. A selected COM frequency displayed in green indicates that the COM transceiver is selected on the Audio Panel (**COM1 MIC** or **COM2 MIC** Keys). Both active COM Frequencies appearing in white indicate that no COM radio is selected for transmitting (**PA** Key is selected on the Audio Panel).

Frequencies in the standby field are displayed in either white or gray. The standby frequency in the tuning box is white. The other standby frequency is gray.

During reception of audio from the COM radio selected for transmission, audio from the other COM radio is muted.

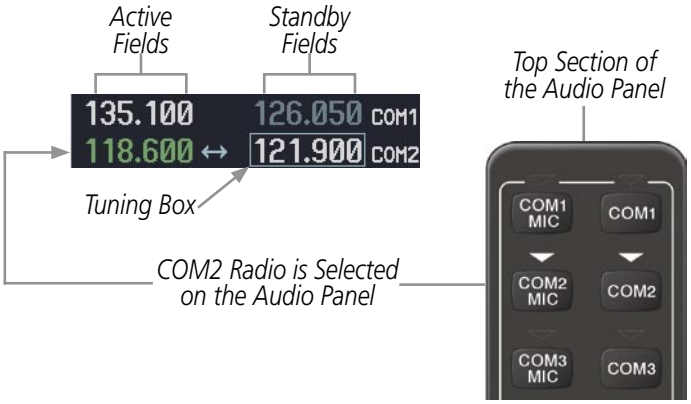


Figure 4-3 Selecting a COM Radio for Transmit

TRANSMIT/RECEIVE INDICATIONS

During COM transmission, a white 'TX' appears by the active COM frequency replacing the Frequency Transfer Arrow. On the Audio Panel, when the active COM is transmitting, the active transceiver **COM MIC** Key Annunciator flashes approximately once per second.

During COM signal reception, a white 'RX' appears by the active COM frequency replacing the Frequency Transfer Arrow.

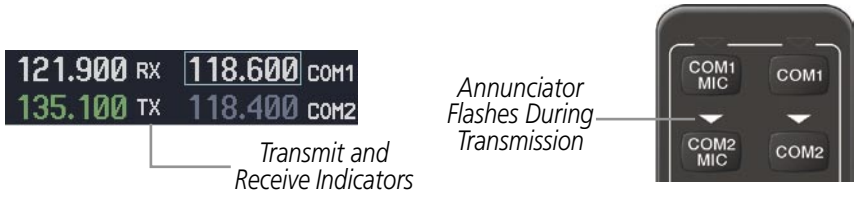


Figure 4-4 COM Radio Transmit and Receive Indications

STUCK MICROPHONE

If the push-to-talk (PTT) Key becomes stuck, the COM transmitter stops transmitting after 35 seconds of continuous operation. An alert appears on the PFD to advise the crew of a stuck microphone.

The **COM1 MIC** or **COM2 MIC** Key Annunciator on the Audio Panel continues to flash as long as the PTT Key remains stuck.

Figure 4-5 Stuck Microphone Alert

COM TRANSCEIVER MANUAL TUNING

The COM frequency controls and frequency boxes are on the right side of the PFD and MFD.

Manually tuning a COM frequency:

1) Turn the **COM** Knob to tune the desired frequency in the COM Tuning Box.
2) Press the **Frequency Transfer** Key to transfer the frequency to the active field.
3) Adjust the volume level with the COM **VOL/SQ** Knob.
4) Press the COM **VOL/SQ** Knob to turn automatic squelch on and off.

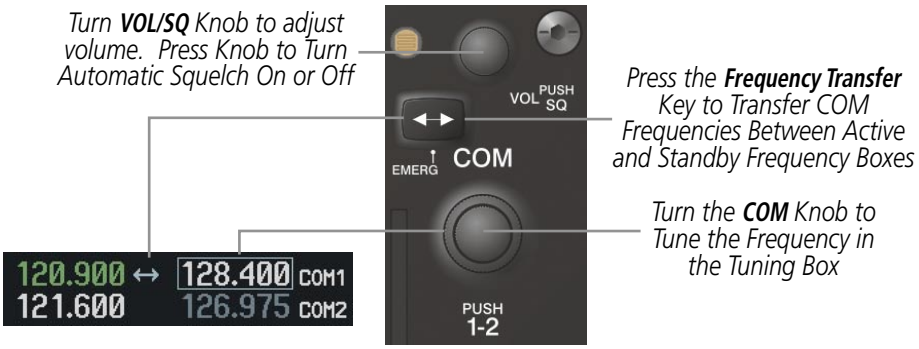

Turn VOL/SQ Knob to adjust volume. Press Knob to Turn Automatic Squelch On or Off
Press the Frequency Transfer Key to Transfer COM Frequencies Between Active and Standby Frequency Boxes
Turn the COM Knob to Tune the Frequency in the Tuning Box
VOL PUSH SQ
EMERG
COM
120.900 ↔ 128.400 COM1
121.600 126.975 COM2
PUSH 1-2

Figure 4-6 COM Frequency Tuning

SELECTING THE RADIO TO BE TUNED

Pressing the small **COM** Knob transfers the frequency tuning box and the Frequency Transfer Arrow between the upper and lower radio frequency fields.

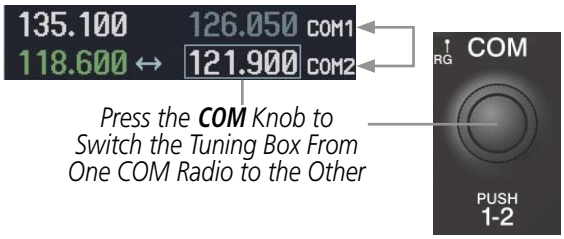

135.100 126.050 COM1
118.600 ↔ 121.900 COM2
Press the COM Knob to Switch the Tuning Box From One COM Radio to the Other
RG
COM
PUSH 1-2

Figure 4-7 Switching COM Tuning Boxes

COM TUNING FAILURE

In case of a COM system tuning failure, the emergency frequency (121.500 MHz) is automatically tuned in the radio in which the tuning failure occurred.

Figure 4-8 COM Tuning Failure

QUICK-TUNING AND ACTIVATING 121.500 MHZ

Pressing and holding the COM **Frequency Transfer** Key for two seconds automatically loads the emergency COM frequency (121.500 MHz) in the active field of the COM radio selected for tuning (the one with the transfer arrow). In the example shown, pressing the Audio Panel **COM2 MIC** Key activates the transceiver.

Figure 4-9 Quickly Tuning 121.500 MHz

AUTO-TUNING THE COM FREQUENCY

COM frequencies can be automatically tuned from the following:

- Nearest Airports Window (PFD)
- WPT – Airport Information Page
- NRST – Nearest Airports Page
- NRST – Nearest (ARTCC, FSS, WX) Frequencies Page
- NRST – Nearest Airspaces Page

AUTO-TUNING FROM THE PFD

COM frequencies for the nearest airports can be automatically tuned from the Nearest Airports Window on the PFD. When the desired frequency is entered, it becomes a standby frequency. Pressing the **Frequency Transfer** Key places this frequency into the COM Active Frequency Field.

Auto-tuning a COM frequency for a nearby airport from the PFD:

1) Press the **NRST** Softkey on the PFD to open the Nearest Airports Window. A list of 25 nearest airport identifiers and COM frequencies is displayed.
2) Turn the **FMS** Knob to scroll through the list and highlight the desired COM frequency.
3) Press the **ENT** Key to load the COM frequency into the COM Standby Tuning Box.
4) Press the **Frequency Transfer** Key to transfer the frequency to the COM Active Frequency Field.

Figure 4-10 Nearest Airports Window (PFD)

AUTO-TUNING FROM THE MFD

Frequencies can be automatically loaded into the COM Frequency Box from pages in the NRST or WPT page group by highlighting the frequency and pressing the **ENT** Key (Figures 4-11, 4-12, and 4-13).

Auto-tuning a COM frequency from the MFD:

1) From any page that the COM frequency can be auto-tuned, activate the cursor by pressing the **FMS** Knob or the appropriate softkey.
2) Turn the **FMS** Knob to place the cursor on the desired COM frequency (Figure 4-13).
3) Press the **ENT** Key to load the COM frequency into the standby field of the selected COM radio.
4) Press the **Frequency Transfer** Key to transfer the frequency to the COM Active Frequency Field.

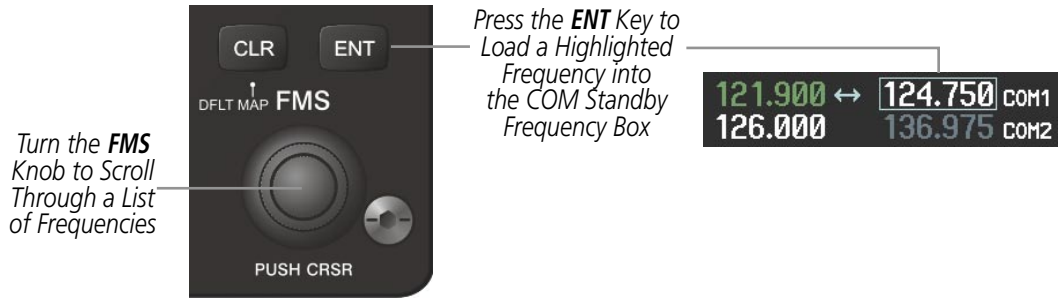

CLR
ENT
DFLT MAP
FMS
PUSH CRSR
Turn the FMS Knob to Scroll Through a List of Frequencies
Press the ENT Key to Load a Highlighted Frequency into the COM Standby Frequency Box
121.900 ↔ 124.750 COM1
126.000 136.975 COM2

Figure 4-11 Frequency Auto-Tuning from the MFD

OR:

5) Press the **MENU** Key to display the PAGE MENU (Figure 4-12).
6) Turn the large **FMS** Knob to scroll through the OPTIONS Menu.
7) Press the **ENT** Key to place the cursor on the desired selection.
8) Scroll through the frequency selections with the **FMS** Knob or the **ENT** Key.
9) Press the **ENT** Key to load the COM frequency into the standby field of the selected COM radio.
10) Press the **Frequency Transfer** Key to transfer the frequency to the COM Active Frequency Field.

Figure 4-12 Nearest Pages PAGE MENU

On the WPT - Airport Information page, the cursor can be placed on the frequency field from the PAGE MENU or by pressing the **FMS** Knob. The **FMS** Knob is used to scroll through the list. The frequency is transferred to the COM Standby Field with the **ENT** Key.

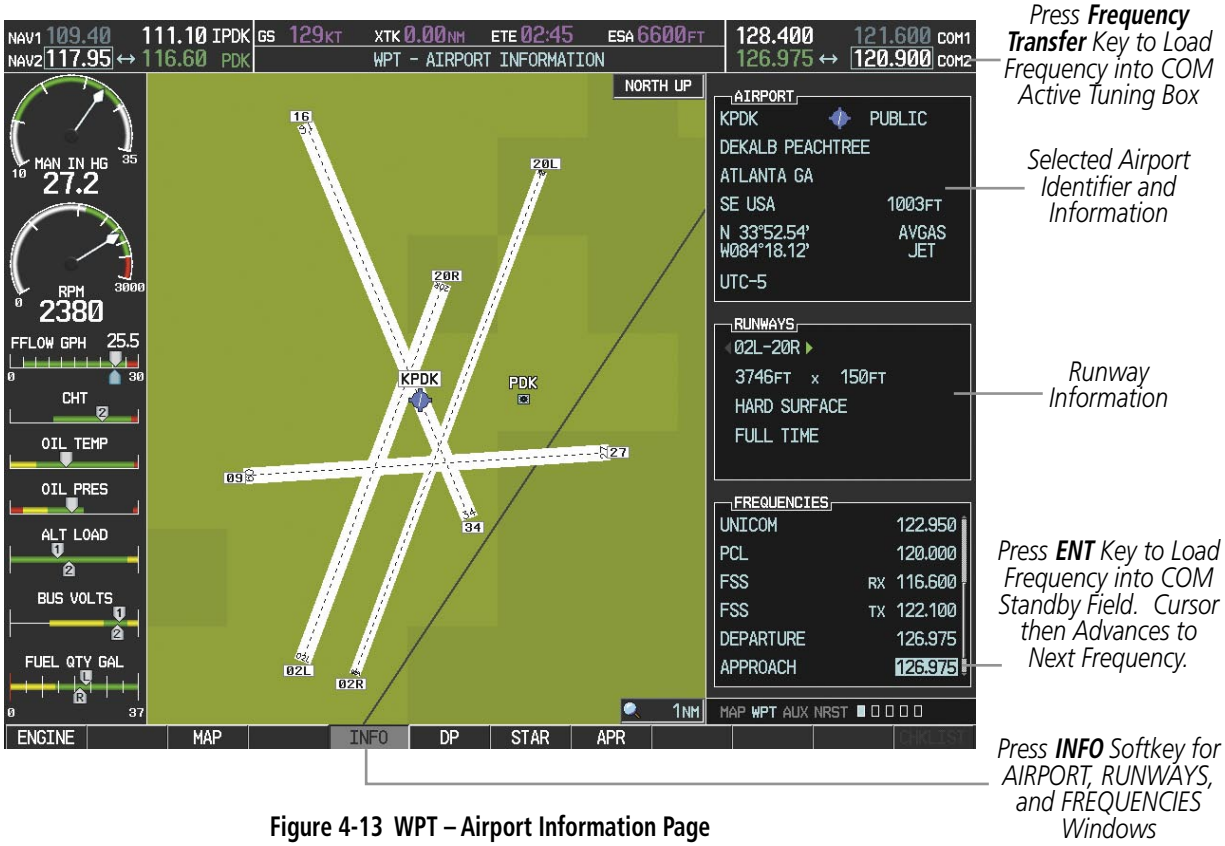


Figure 4-13 WPT – Airport Information Page

COM frequencies can also be auto-tuned from the NRST – Nearest Airspaces, NRST – Nearest Frequencies, and NRST – Nearest Airports Pages on the MFD in a similar manner using the appropriate softkeys or **MENU** Key and the **FMS** Knob.

Figure 4-14 NRST – Nearest Airspaces, NRST – Nearest Airports, and NRST – Nearest Frequencies Pages

FREQUENCY SPACING

The G1000 COM radios can tune either 25 kHz spacing (118.000 to 136.975 MHz) or 8.33 kHz spacing (118.000 to 136.990 MHz) for 760-channel or 3040-channel configuration. When 8.33 kHz channel spacing is selected, all of the 25 kHz channel spacing frequencies are also available in the complete 3040 channel list.

COM channel spacing is set from the MFD on the System Setup Page of the AUX Page Group.

8.33 kHz Channel Spacing

25 kHz Channel Spacing

Figure 4-15 COM Channel Spacing

Changing COM frequency channel spacing:

1) Select the AUX – System Setup Page.
2) Press the **FMS** Knob to activate the flashing cursor.
3) Turn the large **FMS** Knob to highlight the Channel Spacing Field in the COM Configuration Box.
4) Turn the small **FMS** Knob to select the desired channel spacing.
5) Press the **ENT** Key to complete the channel spacing selection.

Select 8.33 kHz or 25.0 kHz COM Frequency Channel Spacing

Figure 4-16 AUX – System Setup Page

AUTOMATIC SQUELCH

Automatic Squelch quiets unwanted static noise when no audio signal is received, while still providing good sensitivity to weak COM signals. To disable Automatic Squelch, press the **VOL/SQ** Knob. When Automatic Squelch is disabled, COM audio reception is always on. Continuous static noise is heard over the headsets and speaker, if selected. Pressing the **VOL/SQ** Knob again enables Automatic Squelch.

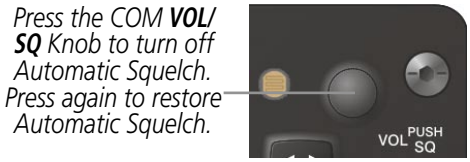


Figure 4-17 Overriding Automatic Squelch

VOLUME

COM radio volume level can be adjusted from 0 to 100% using the **VOL/SQ** Knob. Turning the knob clockwise increases volume, turning the knob counterclockwise decreases volume. When adjusting volume, the level is displayed in place of the standby frequencies. Volume level indication remains for two seconds after the change.

Figure 4-18 COM Volume Level

4.3 NAV OPERATION

NAV RADIO SELECTION AND ACTIVATION

The NAV Frequency Box is composed of four fields consisting of two standby fields and two active fields. In the NAV Frequency Box, the active frequencies are on the right side and the standby frequencies are on the left.

A NAV radio is selected for navigation by pressing the **CDI** Softkey located on the PFD The active NAV frequency selected for navigation is displayed in green. Pressing the **CDI** Softkey once selects NAV1 as the navigation radio. Pressing the **CDI** Softkey twice selects NAV2 as the navigation radio. Pressing the **CDI** Softkey a third time activates GPS mode. Pressing the **CDI** Softkey again cycles back to NAV1.

While cycling through the **CDI** Softkey selections, the NAV Tuning Box and the Frequency Transfer Arrow are placed in the active NAV Frequency Field and the active NAV frequency color changes to green.

The three navigation modes that can be cycled through are:

- VOR1 (or LOC1) – If NAV1 is selected, a green single line arrow (not shown) labeled either 'VOR1' or 'LOC1' is displayed on the HSI and the active NAV1 frequency is displayed in green.
- VOR2 (or LOC2) – If NAV2 is selected, a green double line arrow (shown) labeled either 'VOR2' or 'LOC2' is displayed on the HSI and the active NAV2 frequency is displayed in green.
- GPS – If GPS Mode is selected, a magenta single line arrow (not shown) appears on the HSI and neither NAV radio is selected. Both active NAV frequencies are then displayed in white.

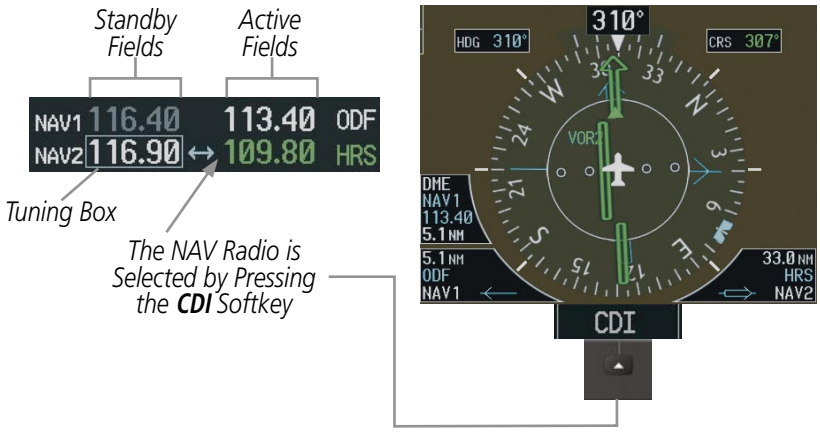


Figure 4-19 Selecting a NAV Radio for Navigation

See the Flight Instruments Section for selecting the bearing information windows (VOR) and using VOR as the source for the bearing pointer.

The NAV radio is selected for listening by pressing the corresponding key on the Audio Panel. Pressing the **NAV1, NAV2,** or **DME** Key selects and deselects the navigation radio source. Selected audio can be heard over the headset and the speakers (if selected). All radios can be selected individually or simultaneously.

Figure 4-20 Selecting a NAV Radio Receiver

NAV RECEIVER MANUAL TUNING

The NAV frequency controls and frequency boxes are on the left side of the PFD and MFD.

Manually tuning a NAV frequency:

1) Turn the **NAV** Knob to tune the desired frequency in the NAV Tuning Box.
2) Press the **Frequency Transfer** Key to transfer the frequency to the NAV Active Frequency Field.
3) Adjust the volume level with the NAV **VOL/ID** Knob.
4) Press the NAV **VOL/ID** Knob to turn the Morse code identifier audio on and off.

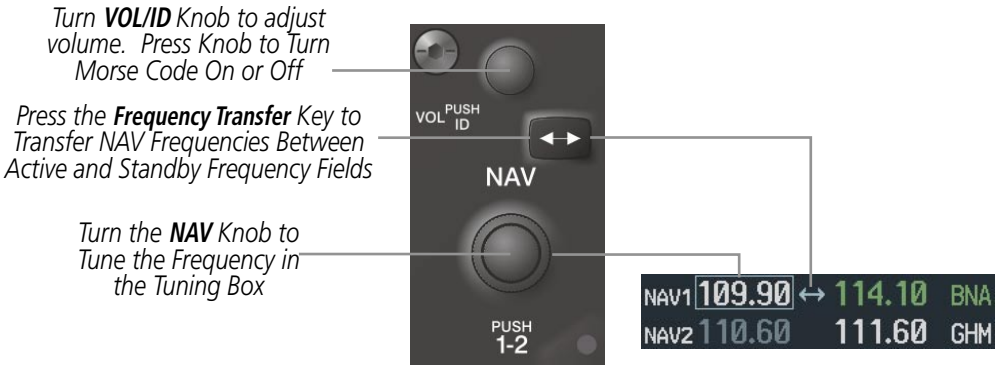

Turn VOL/ID Knob to adjust volume. Press Knob to Turn Morse Code On or Off
Press the Frequency Transfer Key to Transfer NAV Frequencies Between Active and Standby Frequency Fields
Turn the NAV Knob to Tune the Frequency in the Tuning Box
VOL PUSH ID
NAV
PUSH 1-2
NAV1 109.90 ↔ 114.10 BNA
NAV2 110.60 111.60 GHM

Figure 4-21 NAV Frequency Tuning

SELECTING THE RADIO TO BE TUNED

Pressing the small **NAV** Knob transfers the frequency tuning box and the Frequency Transfer Arrow between the upper and lower radio frequency fields.

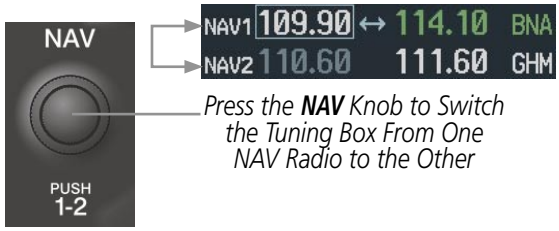

NAV
PUSH
1-2
NAV1 109.90 ↔ 114.10 BNA
NAV2 110.60 111.60 GHM
Press the NAV Knob to Switch the Tuning Box From One NAV Radio to the Other

Figure 4-22 Switching NAV Tuning Boxes

VOR/LOC ID

When the Morse code Identifier audio is on for a NAV radio, a white 'ID' appears to the left of the active NAV frequency.

In the example shown, in order to listen to either station identifier, press the **NAV1** or **NAV2** Key on the Audio Panel. Pressing the **VOL/ID** Knob turns off the Morse code audio only in the radio with the NAV Tuning Box. To turn off both NAV IDs, transfer the NAV Tuning Box between NAV1 and NAV2 with the small **NAV** Knob and press the **VOL/ID** Knob again to turn the Morse code off in the other radio.

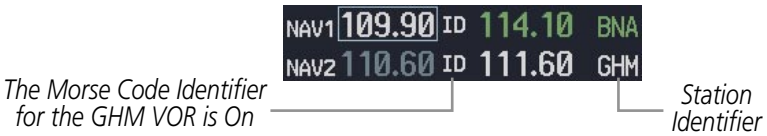


Figure 4-23 NAV Radio ID Indication

VOLUME

NAV Radio volume level can be adjusted from 0 to 100% using the **VOL/ID** Knob. Turning the knob clockwise increases volume, counterclockwise decreases volume.

When adjusting, the level is displayed in place of the standby frequencies. Volume level indication remains for two seconds after the change.

Figure 4-24 NAV Volume Levels

AUTO-TUNING THE NAV FREQUENCY

NAV frequencies can be selected and loaded from the following MFD pages:

- WPT – Airport Information
- WPT – VOR Information
- NRST – Nearest Airports
- NRST – Nearest VOR
- NRST – Nearest (WX, VOR) Frequencies
- NRST – Nearest Airspaces

The MFD provides auto-tuning of NAV frequencies from waypoint and nearest pages. During enroute navigation, the NAV frequency is entered automatically into the NAV standby frequency field. During approach activation the NAV frequency is entered automatically into the NAV active frequency field.

Frequencies can be automatically loaded into the NAV Frequency Boxes by highlighting the frequency and pressing the **ENT** Key (Figures 4-25, 4-26, and 4-27).

Auto-tuning from the MFD:

1) From any page that the NAV frequency can be auto-tuned, activate the cursor by pressing the **FMS** Knob or the appropriate softkey.
2) Turn the **FMS** Knob to place the cursor on the desired NAV identifier.
3) Press the **FREQ** Softkey to place the cursor on the NAV frequency (Figure 4-27).
4) Press the **ENT** Key to load the NAV frequency into the standby field of the selected NAV radio.
5) Press the **Frequency Transfer** Key to transfer the frequency to the NAV Active Frequency Field.

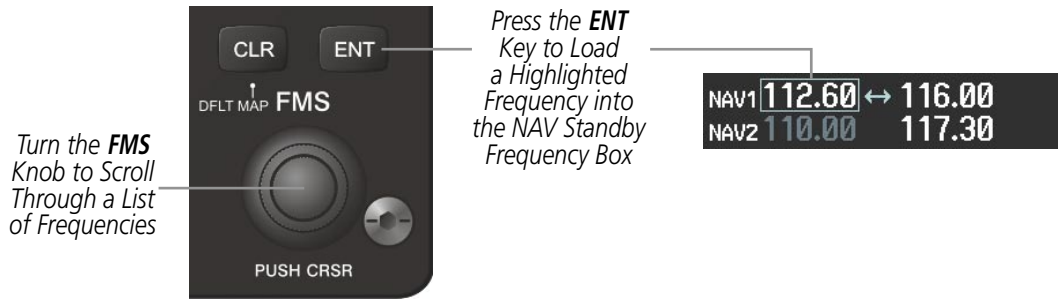

CLR
ENT
DFLT MAP
FMS
PUSH CRSR
Turn the FMS Knob to Scroll Through a List of Frequencies
Press the ENT Key to Load a Highlighted Frequency into the NAV Standby Frequency Box
NAV1 112.60 ↔ 116.00
NAV2 110.00 117.30

Figure 4-25 NAV Frequency Auto-Tuning from the MFD

OR:

6) Press the **MENU** Key to display the PAGE MENU (Figure 4-26).

7) Turn the large **FMS** Knob to scroll through the OPTIONS Menu.

8) Press the **ENT** Key to place the cursor on the desired selection.

9) Scroll through the frequency selections with the **FMS** Knob or the **ENT** Key.

10) Press the **ENT** Key to load the COM frequency into the standby field of the selected COM radio.

11) Press the **Frequency Transfer** Key to transfer the frequency to the COM Active Frequency Field.

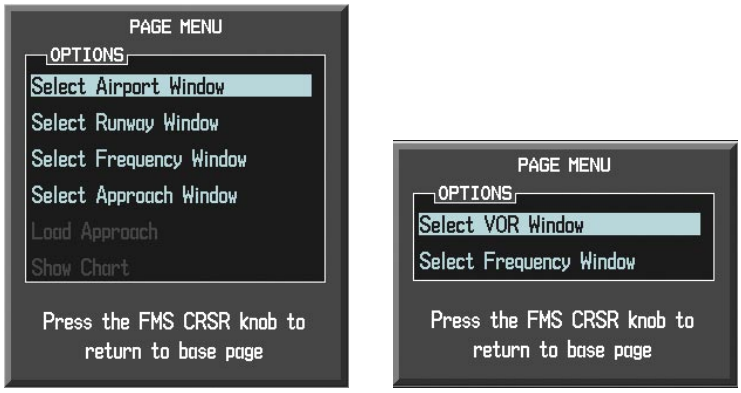


Figure 4-26 Nearest Pages PAGE MENU

In the example shown, the VOR list is selected with the **VOR** Softkey or from the PAGE MENU. The **FMS** Knob or **ENT** Key is used to scroll through the list. The cursor is placed on the frequency with the **FREQ** Softkey and loaded into the NAV Tuning Box with the **ENT** Key.

Figure 4-27 NRST – Nearest VOR Page

While enroute, NAV frequencies can also be auto-tuned from the NRST – Nearest Airports, WPT – Airport Information, WPT – VOR Information, and NRST – Nearest Frequencies Pages on the MFD in a similar manner using the appropriate softkeys or **MENU** Key, the **FMS** Knob, and the **ENT** Key.

Figure 4-28 NRST – Nearest Frequencies, WPT – VOR Information, WPT – Airport Information, and NRST – Nearest Airports Pages

AUTO-TUNING NAV FREQUENCIES ON APPROACH ACTIVATION

NOTE: *The primary NAV frequency is auto-tuned upon loading a VOR or ILS/Localizer approach.*

NOTE: *When an ILS/LOC approach has been activated in GPS Mode, the system switches to NAV Mode as the final approach course is intercepted (within 15 nm of the FAF). See the GPS Navigation section for details.*

NAV frequencies are automatically loaded into the NAV Frequency Box on approach activation.

When loading or activating a VOR or ILS/LOC approach, the approach frequency is automatically transferred to a NAV frequency field as follows:

- If the current CDI source is GPS, the approach frequency is transferred to the NAV1 active frequency field. The frequency that was previously in the NAV1 active frequency field is transferred to standby.
- If the current CDI source is GPS, and if the approach frequency is already loaded into the NAV1 standby frequency field, the standby frequency is transferred to active.
- If the current CDI source is NAV1 or NAV2, the approach frequency is transferred to the standby frequency fields of the selected CDI NAV radio.

MARKER BEACON RECEIVER

NOTE: *The marker beacon indicators operate independently of the marker beacon audio and cannot be turned off.*

The Marker Beacon Receiver is used as part of the ILS. The Marker Beacon Receiver is always on and detects any marker beacon signals within the reception range of the aircraft.

The receiver detects the three marker tones, outer, middle, and inner, and illuminates the marker beacon annunciations. The marker beacon annunciations are located to the left of the altimeter on the PFD.

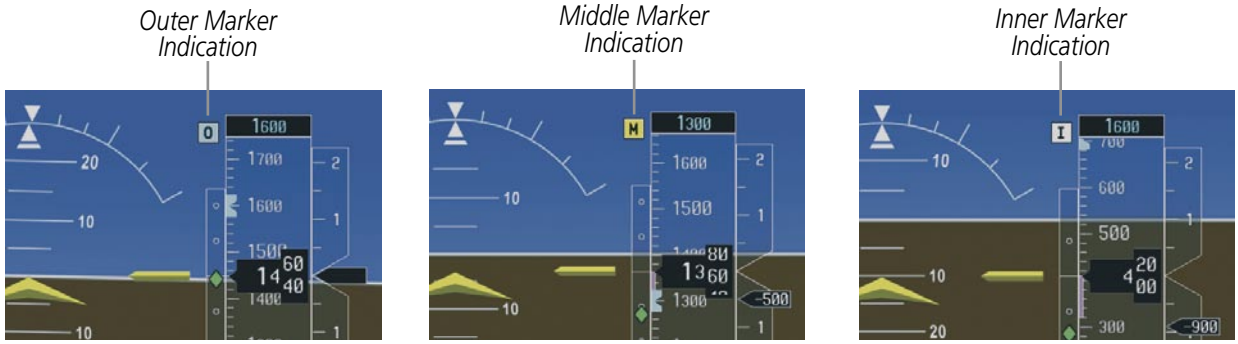


Figure 4-29 Marker Beacon Signal Annunciations on the PFD

Figure 4-30 Marker Beacon Keys

The Audio Panel provides three different states of marker beacon operation; On, Muted, and Deselected. Pressing the **MKR/MUTE** Key selects and deselects the marker beacon audio. The key annunciator indicates when marker beacon audio is selected.

During marker beacon audio reception, pressing the **MKR/MUTE** Key mutes the audio but does not affect the marker annunciations (Figure 4-29). The marker tone is silenced, then waits for the next marker tone. The **MKR/MUTE** Key annunciator is illuminated, indicating audio muting. The audio returns when the next marker beacon signal is received. If the **MKR/MUTE** Key is pressed during signal reception (O, M, I indication) while marker beacon audio is muted, the audio is deselected and the **MKR/MUTE** Key annunciator is extinguished.

Pressing the **HI SENS** Key switches between increased and decreased marker beacon signal sensitivity. The HI SENS function (annunciator illuminated) is used to receive an earlier indication when nearing a marker during an approach. The LO SENS function (annunciator extinguished) results in a narrower marker dwell while over a station.

DME TUNING (OPTIONAL)

NOTE: *When another window is turned on, the DME Tuning Window is replaced on the PFD.*

NOTE: *When turning on the G1000 for use, the system remembers the last frequency used for DME tuning and the NAV1, NAV2, or HOLD state prior to shutdown.*

The G1000 System tunes the optional DME transceiver. The UHF DME frequency is tuned by pairing with a VHF NAV frequency. DME frequency pairing is automatic and only the VHF NAV frequency is shown.

The DME Tuning Window is located to the right of the HSI in the lower right corner of the PFD. The DME transceiver is tuned by selecting NAV1, NAV2, or HOLD in the DME Tuning Window. Pressing the **DME** Softkey switches the DME Tuning Window on and off.

Figure 4-31 DME Tuning Window

The following DME transceiver pairing can be selected:

- NAV1 – Pairs the DME frequency from the selected NAV1 frequency.
- NAV2 – Pairs the DME frequency from the selected NAV2 frequency.
- HOLD – When in the HOLD position, the DME frequency remains paired with the last selected NAV frequency.

Selecting DME transceiver pairing:

1) Press the **DME** Softkey to display the DME Tuning Window.
2) Turn the small **FMS** Knob to select the DME tuning mode.
3) Press the **ENT** Key to complete the selection.

Pressing the **CLR** Key or **FMS** Knob while in the process of DME pairing cancels the data entry and reverts back to the previously selected DME tuning state. Pressing the **FMS** Knob activates/deactivates the cursor in the DME Tuning Window.

See the Flight Instruments Section for displaying the DME information window.

4.4 GTX 33 MODE S TRANSPONDER

The GTX 33 Mode S Transponder provides Mode A, Mode C, and Mode S interrogation and reply capabilities. Selective addressing or Mode Select (Mode S) capability includes the following features:

- Level-2 reply data link capability (used to exchange information between aircraft and ATC facilities)
- Surveillance identifier capability
- Flight ID reporting – The Mode S Transponder reports aircraft identification as either the aircraft registration or a unique Flight ID (Flight Identification).
- Altitude reporting
- Airborne status determination
- Transponder capability reporting
- Mode S Enhanced Surveillance (EHS) requirements
- Acquisition squitter – Acquisition squitter, or short squitter, is the transponder 24-bit identification address. The transmission is sent periodically, regardless of the presence of interrogations. The purpose of acquisition squitter is to enable Mode S ground stations and aircraft equipped with a Traffic Avoidance System (TAS) to recognize the presence of Mode S-equipped aircraft for selective interrogation.

  The Hazard Avoidance section provides more details on traffic avoidance systems.

TRANSPONDER SOFTKEY CONTROLS

Transponder function is displayed on three levels of softkeys on the PFD: Top-level, Mode Selection, and Code Selection.

When the top-level **XPDR** Softkey is pressed, the Mode Selection softkeys appear: **STBY, ON, ALT, VFR, CODE, IDENT, BACK.**

When the **CODE** Softkey is pressed, the number softkeys appear: **0, 1, 2, 3, 4, 5, 6, 7, IDENT, BKSP, BACK**. The digits 8 and 9 are not used for code entry. Pressing the numbered softkeys in sequence enters the transponder code. If an error is made, pressing the **BKSP** Softkey moves the code selection cursor to the previous digit. Pressing the **BKSP** Softkey again moves the cursor to the next previous digit.

Pressing the **BACK** Softkey during code selection reverts to the Mode Selection Softkeys. Pressing the **BACK** Softkey during mode selection reverts to the top-level softkeys.

Pressing the **IDENT** Softkey while in Mode or Code Selection initiates the ident function and reverts to the top-level softkeys.

After 45 seconds of transponder softkey inactivity, the system reverts back to the top-level softkeys.

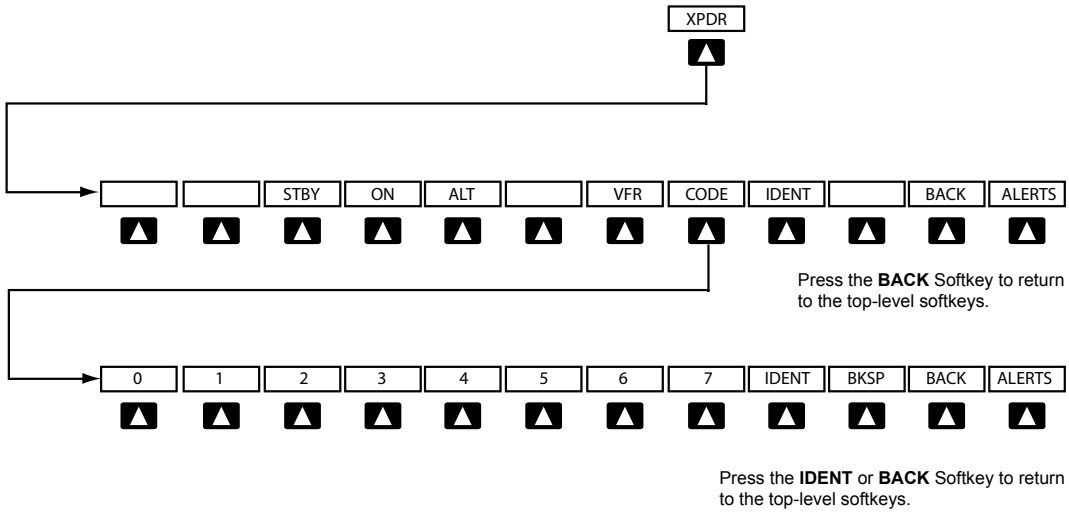


Figure 4-32 Transponder Softkeys

TRANSPONDER MODE SELECTION

Mode selection can be automatic (Ground and Altitude Modes) or manual (Standby, ON, and Altitude Modes). The **STBY, ON,** and **ALT** Softkeys can be accessed by pressing the **XPDR** Softkey.

Selecting a transponder mode:

1) Press the **XPDR** Softkey to display the Transponder Mode Selection Softkeys.
2) Press the desired softkey to activate the transponder mode.

GROUND MODE

Ground Mode is normally selected automatically when the aircraft is on the ground. The transponder powers up in the last mode it was in when shut down. Ground Mode can be overridden by pressing any one of the Mode Selection Softkeys. A green 'GND' indication and transponder code appear in the mode field of the Transponder Data Box. In Ground Mode, the transponder does not allow Mode A and Mode C replies, but it does permit acquisition squitter and replies to discretely addressed Mode S interrogations.

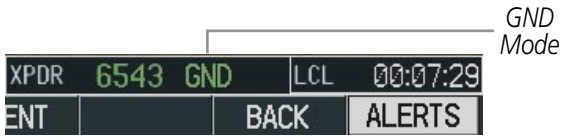


Figure 4-33 Ground Mode

STANDBY MODE (MANUAL)

NOTE: *In Standby Mode, the IDENT function is inoperative.*

Standby Mode can be selected at any time by pressing the **STBY** Softkey. In Standby, the transponder does not reply to interrogations, but new codes can be entered. When Standby is selected, a white 'STBY' indication and transponder code appear in the mode field of the Transponder Data Box. In all other modes, these fields appear in green.

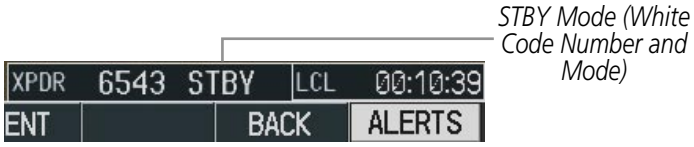


Figure 4-34 Standby Mode

MANUAL ON MODE

ON Mode can be selected at any time by pressing the **ON** Softkey. ON Mode generates Mode A and Mode S replies, but Mode C altitude reporting is inhibited. In ON Mode, a green 'ON' indication and transponder code appear in the mode field of the Transponder Data Box.

Figure 4-35 ON Mode

ALTITUDE MODE (AUTOMATIC OR MANUAL)

Altitude Mode is automatically selected when the aircraft becomes airborne. Altitude Mode may also be selected manually by pressing the **ALT** Softkey.

If Altitude Mode is selected, a green 'ALT' indication and transponder code appear in the mode field of the Transponder Data Box, and all transponder replies requesting altitude information are provided with pressure altitude information.

Figure 4-36 Altitude Mode

REPLY STATUS

When the transponder sends replies to interrogations, a white 'R' indication appears momentarily in the reply status field of the Transponder Data Box.

Figure 4-37 Reply Indication

ENTERING A TRANSPONDER CODE

NOTE: *When entering a code, pressing the **BKSP** Softkey moves the code selection cursor to the previous digit.*

A total of 4096 discrete identification codes can be selected with the Code Selection Softkeys.

Entering a transponder code:

1) Press the **XPDR** Softkey to display the Transponder Mode Selection Softkeys.
2) Press the **CODE** Softkey to display the Transponder Code Selection Softkeys, for digit entry.
3) Press the digit softkeys to enter the code in the code field. When entering the code, the next softkey in sequence must be pressed within 10 seconds, or the entry is cancelled and restored to the previous code. Five seconds after the fourth digit has been entered, the transponder code becomes active.

Figure 4-38 Entering a Code

NOTE: *The pre-programmed VFR Code is set at the factory to 1200.*

The VFR code can be entered either manually, each digit at a time, or by pressing the **XPDR** Softkey, then the **VFR** Softkey. When the **VFR** Softkey is pressed, the pre-programmed VFR code is automatically displayed in the code field of the Transponder Data Box.

Pressing the **VFR** Softkey again restores the previous identification code.

IDENT FUNCTION

NOTE: *In Standby Mode, the* ***IDENT*** *Softkey is inoperative.*

Pressing the **IDENT** Softkey sends an ID indication to Air Traffic Control (ATC). The ID return distinguishes one transponder from all the others on the air traffic controller's radar screen.

The **IDENT** Softkey appears in all levels of transponder softkeys. When the **IDENT** Softkey is pressed, a green 'IDENT' indication is displayed in the mode field of the Transponder Data Box for a duration of 18 seconds.

When the **IDENT** Softkey is pressed while in Mode or Code Selection, the system reverts to the top-level softkeys.

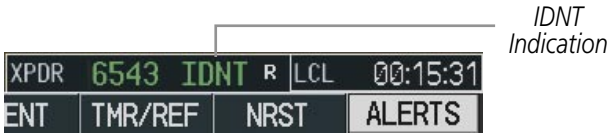


Figure 4-39 IDENT Indication

FLIGHT ID REPORTING

NOTE: *If the Flight ID is required but the system is not configured for it, contact a Garmin-authorized service center for configuration.*

When the flight crew must enter the Flight ID before flight operation, the number is entered in the Timer/References Window. The Flight ID is not to exceed seven characters. No space is needed when entering Flight ID. When a Flight ID contains a space, the system automatically removes it upon completion of Flight ID entry.

Entering a Flight ID:

1) Press the **TMR/REF** Softkey to display the Timer/References Window.
2) Press the **FMS** Knob to activate the selection cursor.
3) Turn the **FMS** Knob to enter the desired Flight ID.
4) Press the **ENT** Key to complete Flight ID entry.

If an error is made during Flight ID entry, pressing the **CLR** Key moves the cursor back one space for each press of the key. If an incorrect Flight ID is discovered after the unit begins operation, reenter the correct Flight ID using the same procedure.

Figure 4-40 Timer/References Window, Entering Flight ID

4.5 ADDITIONAL AUDIO PANEL FUNCTIONS

POWER-UP AND FAIL-SAFE OPERATION

POWER-UP

The Audio Panel performs a self-test during power-up. During the self-test all Audio Panel annunciator lights illuminate for approximately two seconds. Once the self-test is completed, most of the settings are restored to those in use before the unit was last turned off.

FAIL-SAFE OPERATION

If there is a failure of the Audio Panel, a fail-safe circuit connects the pilot's headset and microphone directly to the COM1 transceiver. Audio is not available on the speaker.

MONO/STEREO HEADSETS

Stereo headsets are recommended for use with the G1000.

Using a monaural headset in a stereo jack shorts the right headset channel output to ground. While this does not damage the Audio Panel, a person listening on a monaural headset hears only the left channel in both ears. If a monaural headset is used at one of the passenger positions, any other passenger using a stereo headset hears audio in the left ear only.

SPEAKER

All of the radios can be heard over the cabin speaker. Pressing the **SPKR** Key selects and deselects the cabin speaker. Speaker audio is muted when the PTT is pressed. Certain aural alerts and warnings (autopilot, traffic, altitude) are always heard on the speaker, even when the speaker is not selected.

The speaker volume is adjustable within a nominal range. Contact a Garmin-authorized service center for volume adjustment.

Figure 4-41 Passenger Address and Speaker Keys

INTERCOM

The Audio Panel includes a six-position intercom system (ICS) and two stereo music inputs for the pilot, copilot and up to four passengers. The intercom provides Pilot and Copilot isolation from the passengers and aircraft radios.

Figure 4-42 Intercom Controls

PILOT KEY Annunciator	COPLT KEY Annunciator	Pilot Hears	Copilot Hears	Passenger Hears
OFF	OFF	Selected radios, aural alerts, pilot, copilot, passengers, MUSIC 1	Selected radios, aural alerts, pilot, copilot, passengers, MUSIC 1	Selected radios, aural alerts, pilot, copilot, passengers, MUSIC 2
ON	OFF	Selected radios, aural alerts, pilot	Copilot, passengers, MUSIC 1	Copilot, passengers, MUSIC 2
OFF	ON	Selected radios, aural alerts, pilot; passengers, MUSIC 1	Copilot	Selected radios, aural alerts, pilot, passengers, MUSIC 2
ON	ON	Selected radios, aural alerts, pilot, copilot	Selected radios, aural alerts, pilot, copilot	Passengers; MUSIC 2

Table 4-1 ICS Isolation Modes

Pilot isolation is selected when the PILOT Annunciator is illuminated. During Pilot isolation, the pilot can hear the selected radios and aural alerts and warnings. The copilot and passengers can communicate with each other. The copilot is isolated from aural alerts and warnings.

Copilot isolation is selected when the COPLT Annunciator is illuminated. The copilot is isolated from the selected radios, aural alerts and warnings, and everyone else. The pilot and passengers can hear the selected radios and communicate with each other.

When both the PILOT and COPLT Annunciators are illuminated, the pilot and copilot can hear the selected radios and communicate with each other. The passengers are isolated from the pilot and copilot but can communicate with each other.

When both the PILOT and the COPLT Annunciators are extinguished, everyone hears the selected radios and is able to communicate with everyone else.

INTERCOM VOLUME AND SQUELCH

The **PILOT/PASS** Knob controls volume or manual squelch adjustment for the pilot and copilot/passenger. The small knob controls the pilot volume and squelch. The large knob controls the copilot/passenger volume and squelch. The VOL and SQ annunciations at the bottom of the unit indicate which function the knob is controlling. Pressing the **PILOT/PASS** Knob switches between volume and squelch control as indicated by the VOL or SQ annunciation being illuminated.

The **MAN SQ** Key allows either automatic or manual control of the squelch setting. When the MAN SQ Annunciator is extinguished (Automatic-Squelch is on), the **PILOT/PASS** Knob controls only the volume (pressing the **PILOT/PASS** Knob has no effect on the VOL/SQ selection).

When the MAN SQ Annunciator is illuminated (Manual Squelch), the **PILOT/PASS** Knob controls both volume and squelch.

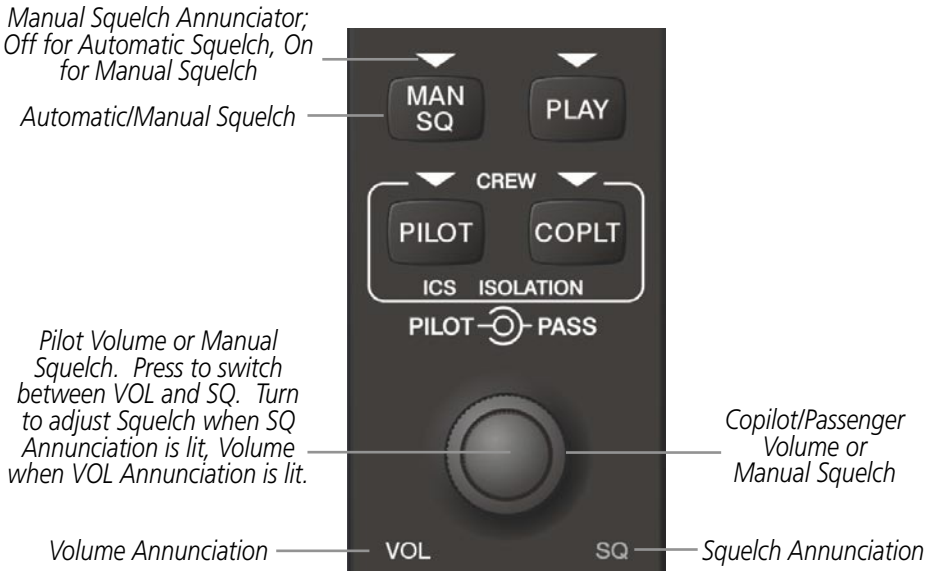

Manual Squelch Annunciator; Off for Automatic Squelch, On for Manual Squelch
Automatic/Manual Squelch
MAN SQ
PLAY
CREW
PILOT
COPLT
ICS ISOLATION
PILOT PASS
Pilot Volume or Manual Squelch. Press to switch between VOL and SQ. Turn to adjust Squelch when SQ Annunciation is lit, Volume when VOL Annunciation is lit.
Copilot/Passenger Volume or Manual Squelch
Volume Annunciation
VOL
SQ
Squelch Annunciation

Figure 4-43 Volume/Squelch Control

PASSENGER ADDRESS (PA) SYSTEM

A passenger address system is provided by pressing the **PA** Key for delivering voice messages over the cabin speaker. A Push-to-Talk (PTT) must be pressed to deliver PA announcements.

When PA is selected on the Audio Panel, the COM MIC Annunciator is extinguished, and the active COM frequency changes to white, indicating that there is no COM selected. The PA Annunciator flashes about once per second while the PTT is depressed.

CLEARANCE RECORDER AND PLAYER

The Audio Panel contains a digital clearance recorder that plays up to 2.5 minutes of COM signal recording from the selected COM radio. Recorded COM audio is stored in separate memory blocks. Once the 2.5 minutes of recording time have been reached, the recorder begins recording over the stored memory blocks, starting from the oldest block.

The **PLAY** Key controls the play function. The PLAY Annunciator flashes, indicating when play is in progress. The PLAY Annunciator turns off after the present memory block has finished playing.

Pressing the **PLAY** Key once plays the latest recorded memory block and then returns to normal operation. Pressing the **MKR/MUTE** Key during play of a memory block stops play. If a COM input signal is detected during play of a recorded memory block, play is halted.

Pressing the **PLAY** Key while audio is playing begins playing the previously recorded memory block. Each subsequent press of the **PLAY** Key selects the previously recorded memory block.

Powering off the unit automatically clears all recorded blocks.

Figure 4-44 Play Key

SPLIT COM

NOTE: *Split COM performance is affected by the distance between the COM antennas and the separation of the tuned frequencies. If the selected COM1 and COM2 frequencies are too close together, interference may be heard during transmission on the other radio.*

During Split COM Operation, both the pilot and the copilot can transmit simultaneously over separate radios. The pilot can still monitor NAV1, NAV2, DME, and MKR Audio as selected, but the copilot is only able to monitor COM2.

Pressing the **COM 1/2** Key selects Split COM Operation. The COM 1/2 Annunciator is illuminated indicating Split COM Operation. Split COM Operation is cancelled by pressing the **COM 1/2** Key again, at which time the annunciator is extinguished.

When Split COM Operation is selected, COM1 is used by the pilot and COM2 is used by the copilot. The COM1 MIC Annunciator flashes when the pilot's microphone PTT is pressed. The COM2 MIC Annunciator flashes when the copilot's microphone PTT is pressed.

ENTERTAINMENT INPUTS

NOTE: *MUSIC 1 and MUSIC 2 inputs cannot be completely turned off. Audio level for MUSIC 1 and MUSIC 2 can be adjusted by a Garmin-authorized service center.*

The Audio Panel provides two stereo auxiliary entertainment inputs: MUSIC 1 and MUSIC 2. These inputs are compatible with popular portable entertainment devices such as MP3 and CD players. Two 3.5 mm stereo phone jacks are installed in convenient locations for audio connection. The headphone outputs of the entertainment devices are plugged into the MUSIC 1 or MUSIC 2 jacks.

The current ICS state of isolation affects the distribution of the entertainment input MUSIC 1. (See Table 4-1).

MUSIC 1

MUSIC 1 can be heard by the pilot and copilot when both the PILOT and the COPLT Annunciators are extinguished. MUSIC 1 can also be heard by the pilot when the COPLT Annunciator is illuminated and by the copilot when the PILOT Annunciator is illuminated.

MUSIC 1 Muting

MUSIC 1 muting occurs when aircraft radio or marker beacon activity is heard. MUSIC 1 is always soft muted when an interruption occurs from an aircraft radio. Soft muting is the gradual return of MUSIC 1 to its original volume level. The time required for MUSIC 1 volume to return to normal is between one-half and four seconds.

MUSIC 1 Muting Enable/Disable

Pressing and holding the **MKR/MUTE** Key for three seconds switches MUSIC 1 muting on and off. When switching, either one or two beeps are heard; one beep indicates that music muting is enabled, two beeps indicate music muting is disabled. MUSIC 1 muting is reset (enabled) during power up.

MUSIC 2

MUSIC 2 can be heard only by the passengers and is never muted.

DATA LINK RECEIVER XM RADIO SYSTEM

XM Radio Audio from the Data Link Receiver may be heard by the pilot and passengers simultaneously (optional: requires subscription to XM Audio Service). Refer to the Additional Features Section for more details on the Data Link Receiver.

Connecting a stereo input to either MUSIC 1 or MUSIC 2 jacks removes the Data Link Receiver Audio from that input. For example, if passengers prefer their own music while the pilot listens to the Data Link Receiver, the entertainment audio should be connected to the MUSIC 2 jack.

REVERSIONARY MODE

The red **DISPLAY BACKUP** button selects reversionary mode for both displays. Reversionary mode operation displays flight and engine information on both the PFD and MFD, in case of display failure.

See the System Overview Section for more information.

Figure 4-45 Reversionary Mode Button

4.6 PREFLIGHT PROCEDURE FOR THE GMA 1347 AUDIO PANEL

NOTE: *If the pilot and/or copilot are using headsets that have a high/low switch or volume control knob, verify that the switch is in the high position and the volume control on the headsets are at max volume setting. On single pilot flights verify that all other headsets are not connected to avoid excess noise in the audio system.*

NOTE: *When the **MAN SQ** Key is pressed the ICS squelch can be set manually by the pilot and copilot. If manual squelch is set to full open (SQ annunciated and the knobs turned counterclockwise) background noise is heard in the ICS system as well as during COM transmissions.*

After powering up the G1000 System, the following steps will aid in maximizing the use of the Audio Panel as well as prevent pilot and copilot induced issues. These preflight procedures should be performed each time a pilot boards the aircraft to insure awareness of all audio levels in the Audio Panel and radios.

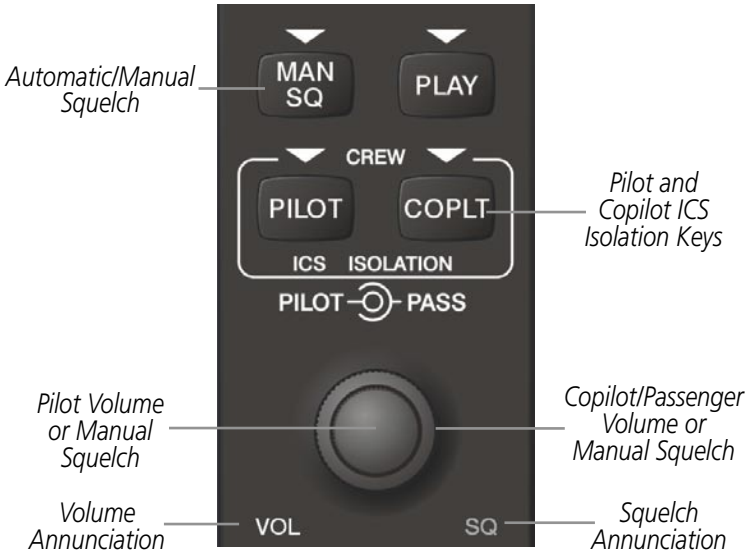


Figure 4-46 Audio Panel Controls

Setting the Audio Panel during preflight:

1) Verify that the PILOT and COPLT Annunciators are extinguished.
2) Verify that the MAN SQ Annunciator is extinguished.
3) Turn the **PILOT/PASS** Knobs clockwise two full turns. This will set the headset audio level to max volume (least amount of attenuation).
4) Adjust radio volume levels (COM, NAV, etc.) to a suitable level.
5) Adjust the **PILOT/PASS** Knob volume to the desired intercom level.

Once this procedure has been completed, the pilot and copilot can change settings to their liking, keeping in mind the notes above.

SECTION 5 GPS NAVIGATION

5.1 INTRODUCTION

This section of the Pilot's Guide provides GPS navigation operating procedures for the G1000 installed in the Beechcraft A36/G36 aircraft. Some prior knowledge of the other sections of the G1000 Pilot's Guide, especially the "how-to" of entering data and MFD Page Groups is necessary in order to fully and properly use the information found in this section. All screenshots are for reference only and are subject to change. This section is organized as follows:

- MFD Navigation Map
- PFD Inset Map and Windows
- Direct to Navigation
- Airport Information
- Intersection Information
- NDB Information
- VOR Information
- User Waypoint Information
- Nearest Airports
- Nearest Intersections
- Nearest NDBs
- Nearest VORs
- Nearest Frequencies
- Nearest Airspaces
- Nearest User Waypoints
- Flight Planning
- Procedures

5.2 NAVIGATION MAP (MFD)

WARNING: *The Navigation Map (land and water data) must not be used for navigation, rather only for situational awareness. Any display indication should be compared with other navigation sources.*

NAVIGATION MAP PAGE

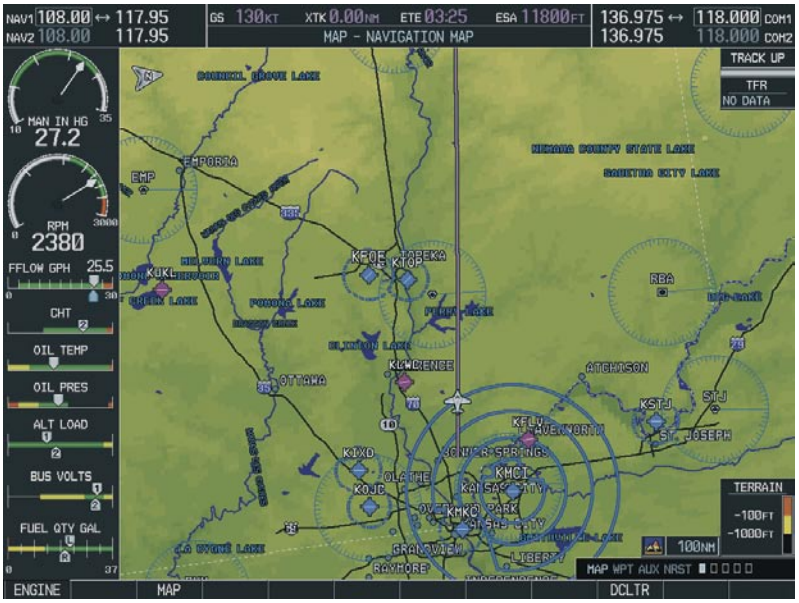


Figure 5-1 Navigation Map Page
(not all map display items shown)

NOTE: *The Navigation Map can be quickly displayed from any page in the G1000 by pressing and momentarily holding the CLR key.*

The Navigation Map Page (Figure 5-3) is the first page in the Map Page Group and provides the following GPS Navigation display capability:

- Map display showing airports, NAVAIDS, airspaces, land data (highways, cities, lakes, rivers, borders, etc.) with names
- Map pointer information (distance and bearing to pointer, location of pointer, name and other pertinent information)
- Map zoom range legend
- Wind direction and speed
- Heading indication
- Aircraft icon representing present position
- Icons for enabled map features

- Track vector
- Topography scale
- Fuel range ring
- Topography data

NOTE: *Navigation Map operations involving the display of traffic, terrain, and weather data are described in the Hazard Awareness Section of the Pilot's Guide.*

NAVIGATION MAP SETUP

This section describes the Navigation Map setup which in most cases will be a "one-time" operation since the setup can be customized to accommodate the individual needs of the pilot and flight plan.

Selecting the Navigation Map Page:

1) Select the Map Page Group.

2) Select the Navigation Map Page. The page group name and page title are displayed below the Navigation Status Box: MAP – NAVIGATION MAP. In addition to turning the **FMS** Knobs, the Navigation Map Page can be selected from any page by selecting and momentarily holding the **CLR** (DFLT MAP) Key.

The map can be customized using the map setup groups listed in the Navigation Map Page Menu (Figure 5-2). To display the menu, select the **MENU** Key (with the Navigation Map Page displayed).

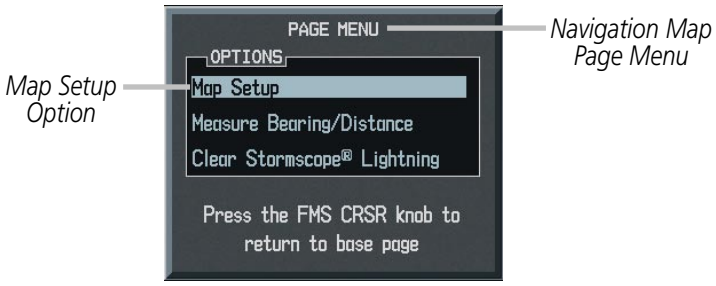


Figure 5-2 Navigation Map Page Menu

Within the Map Setup Option there are five setup groups (Figure 5-3):

- Map
- Weather (refer to the Hazard Awareness Section)
- Traffic (refer to the Hazard Awareness Section)
- Aviation
- Land

Figure 5-3 Map Setup Options

NOTE: *Refer to the appendices for a full description and interpretation of aviation map data.*

Map Group

Figure 5-4 Map Group

Orientation

There are four map orientation selections: North up, Track up, DTK up, and HDG up. The orientation default setting is 'North Up'.

- North up fixes the top of the map to a north heading.
- Track up adjusts the top of the map display to the current ground track.
- Desired Track Up (DTK up) fixes the top of the map display to the desired course.
- Heading Up (HDG up) fixes the top of the map display to the current aircraft heading.

Changing the map orientation:

1) With the Navigation Map Page displayed, press the **MENU** Key. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'ORIENTATION' field. Select the desired orientation and press the **ENT** Key.
4) Press the **FMS** Knob to return to the Navigation Map Page.

Auto Zoom

The automatic zoom feature automatically adjusts the map range from 2000 nm through each lower range, stopping at 1.5 nm as the aircraft approaches the destination waypoint.

Enabling/disabling automatic zoom:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group
4) Press the **ENT** Key.
5) Highlight the 'AUTO ZOOM' field.
6) Select 'On' or 'Off'.
7) Press the **FMS** Knob to return to the Navigation Map Page.

Land Data

The Navigation Map can display background land data (roads, lakes, borders, etc). The background land data can also be removed from the display (turned off).

Enabling/disabling land data:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
4) Highlight the 'LAND DATA' field.
5) Select 'On' or 'Off.'.
6) Press the **FMS** Knob to return to the Navigation Map Page.

Track Vector

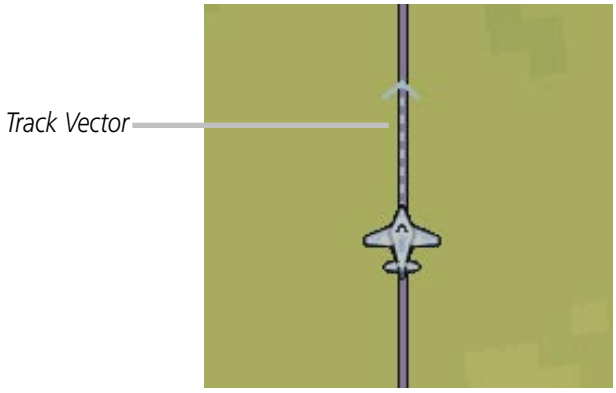


Figure 5-5 Track Vector

The track vector as a dashed light blue line segment with an arrowhead attached to the end, extended to a predicted location in 60 seconds along the current aircraft track (Figure 5-5). The track vector is useful in minimizing track angle error.

Enabling/disabling the track vector:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'TRACK VECTOR' field.
6) Select 'On' or 'Off'.
7) Press the **FMS** Knob to return to the Navigation Map Page.

Wind Vector

The wind vector is displayed in the upper right corner of the map and displays wind direction and speed (in knots). Wind direction is indicated by an arrow.

Enabling/disabling the wind vector:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.

2) Press the **ENT** Key. The Map Setup Menu is displayed.

3) Select the 'Map' group.

4) Press the **ENT** Key.

5) Highlight the 'WIND VECTOR' field.

6) Select 'On' or 'Off'.

7) Press the **FMS** Knob to return to the Navigation Map Page.

Nav Range Ring

Figure 5-6 Nav Range Ring

The Nav Range Ring (Figure 5-6) shows the direction of travel (ground track) on a rotating compass card. The range of the Nav Ring is determined by the map range: 125 feet (500 feet map range) to 500 nm (2000 nm map range).

Enabling/disabling the Nav Range Ring:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'NAV RANGE RING' field.
6) Select 'On' or 'Off'.
7) Press the **FMS** Knob to return to the Navigation Map Page.

Topo Data

Topographic data can be enabled or disabled on the Navigation Map using the 'TOPO DATA' setting. The topo data range is the maximum map range on which topo data is displayed.

Enabling/disabling topo data and select a topo data range:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
3) Highlight the 'TOPO DATA' field.
4) Select 'On' or 'Off'.
5) Highlight the range field. TOPO ranges are from Off to 2000 nm.
6) To change the TOPO range setting, turn the small **FMS** Knob to display the range list.
7) Select the desired range.
8) Press the **ENT** Key.

Topo Scale

The topo scale setting enables or disables the topography range box located in the lower right corner of the Navigation Map. More information on the display of TOPO data is given later in this section of the Pilot's Guide.

Enabling/disabling the topo range box:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group and press the **ENT** Key.
4) Highlight the 'TOPO Range' field.
5) Select 'On' or 'Off'.
6) Press the **FMS** Knob to return to the Navigation Map Page.

Terrain Proximity Data

Refer to the Hazard Awareness Section for a complete description of terrain proximity including how to display it on the Navigation Map Page.

Obstacle Data

Figure 5-7 Obstacle Data

Refer to the Hazard Awareness Section for a complete description of obstacle data including how to display it on the Navigation Map Page.

Fuel Range Ring (Fuel RNG) (RSV)

The map can display a fuel range ring which shows the flight distance that the aircraft has remaining. A dashed green circle indicates the transition range to reserve fuel. A solid green circle indicates the range of all fuel, including the reserve fuel. If only reserve fuel remains, the range is indicated by a solid yellow circle.

Enabling/disabling the fuel range ring and select a fuel range time:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Map' group.
4) Press the **ENT** Key.
5) Highlight the 'FUEL RNG (RSV)' field.
6) Select 'On' or 'Off'.
7) Highlight the fuel reserve time field. The time indicated is the time the aircraft can fly with remaining fuel on board.
8) To change the reserve fuel time, enter a time (00:00 to 23:59; hours:minutes). The default setting is 00:45 minutes.
9) Press the **ENT** Key.
10) Press the **FMS** Knob to return to the Navigation Map Page.

Weather Group

Refer to the Hazard Awareness Section for information pertaining to the setup and display of the Weather group options.

Traffic Group

Refer to the Hazard Awareness Section for information pertaining to the setup and display of the Traffic group options.

Aviation Group

Figure 5-8 Aviation Group

- Active Flight Plan (ACTIVE FPL)- The active flight plan zoom range sets the maximum range at which the active flight plan magenta line is shown on the display (off - 2000 nm).
- Active Flight Plan Waypoint (ACTIVE FPL WPT)- The active flight plan waypoint label size sets the size at which the active flight plan names appear on the display (none, small, medium, and large). The zoom range sets the maximum range at which active flight plan waypoints appear on the display (off - 2000 nm).
- Large, Medium, and Small Airports (LARGE APT, MEDIUM APT, SMALL APT) - The airport label size sets the size at which the large, medium, or small airport names size appear on the display. The zoom range sets the maximum range at which the airports appear on the display:
    - Large: off - 500 nm
    - Medium: off - 300 nm
    - Small: off - 100 nm
- Runway Extension (RWY EXTENSION) - The zoom range sets the maximum range at which runway extensions appear on the display:
    - Off - 100 nm

- Intersection, Non-Directional Beacon, and VOR Waypoints (INT WAYPOINT, NDB WAYPOINT, VOR WAYPOINT) - The INT, NDB, and VOR label size sets the maximum range at which the NAVAIDS names appear on the display. The zoom range sets the maximum range at which the NAVAIDS appear on the display:
    - INT: off - 30 nm
    - NDB: off - 30 nm
    - VOR: off - 300 nm
- Airspace Boundaries (CLASS B/TMA, CLASS C/TCA, and CLASS D) - The airspace zoom range sets the maximum range at which the three classes of airspace appear on the display. The zoom range sets the maximum range at which the airspace boundaries appear on the display:
    - CLASS B: off - 500 nm
    - CLASS C: off - 500 nm
    - CLASS D: off - 300 nm
- "Other" Airspace Boundaries (RESTRICTED, MOA (Military), OTHER AIRSPACE, and TFR (temporary flight restrictions). The other airspace boundary zoom range sets the maximum range at which restricted, MOA, and other (training, caution, danger, warning, and alert areas) airspace boundaries are displayed
- RESTRICTED: off - 500 nm
- MOA (MILITARY): off - 500 nm
- OTHER AIRSPACE: off - 500 nm
- TFR: (only present when GDL 69 is installed): off - 2000 nm

Selecting an aviation group item text size:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Aviation' group.
4) Press the **ENT** Key. The cursor flashes on the 'ACTIVE FPL' field.
5) Select the desired aviation option.
6) Select the desired text size.
7) Press the **ENT** Key to accept the selected text size.
8) Press the **FMS** Knob to return to the Navigation Map Page.

Selecting an aviation group item range:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Aviation' group.
4) Press the **ENT** Key. The cursor flashes on the 'ACTIVE FPL' field.
5) Select the desired aviation option.
6) Select the desired range (RNG).
7) Press the **ENT** Key to accept the selected option.
8) Press the **FMS** Knob to return to the Navigation Map Page.

Land Group

Figure 5-9 Land Group

- Latitude/Longitude (LAT/LON) - The LAT/LON label size sets the size at which latitude/longitude labels appear on the display (none, small, medium, and large). The zoom range sets the maximum range at which LAT/LON waypoints appear on the display (off - 2000 nm).
- Highways, Roads, and Railroads (FREEWAY, LOCAL HWY, LOCAL ROAD, RAILROAD) - The highway and road zoom range sets the maximum range at which highways, roads, and railroads appear on the display:
    - FREEWAY: off - 800 nm
    - NATIONAL HWY: off - 80 nm
    - LOCAL HWY: off - 30 nm
    - LOCAL ROAD: off - 15 nm
    - RAILROAD: off - 30 nm
- Cities and Towns (LARGE CITY, MEDIUM CITY, SMALL CITY) - The cities and town label size sets the maximum range at which city and town names appear on the display. The zoom range sets the maximum range at which cities and towns appear on the display:
    - LARGE CITY (approximate populations greater than 200,000): off - 1500 nm
    - MEDIUM CITY (approximate populations greater than 50,000): off - 200 nm
    - SMALL CITY (approximate populations greater than 5,000): off - 50 nm

- States and Provinces, Rivers and Lakes, and User Waypoints (STATE/PROV, RIVER/LAKE, USER WAYPOINT) - the label range sets the maximum range at which the three categories appear on the display. The zoom range sets the maximum range at which the three categories appear on the display:
  - STATE/PROV: off - 1500 nm
  - RIVER/LAKE off - 500 nm
  - USER WAYPOINT: off - 300 nm

Selecting a land group item text size:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Land' group.
4) Press the **ENT** Key. The cursor flashes on the 'LAT/LON' field.
5) Select the desired land option.
6) Select the desired text size.
7) Press the **ENT** Key to accept the selected option.
8) Press the **FMS** Knob to return to the Navigation Map Page.

Selecting a land group item range:

1) Press the **MENU** Key with the Navigation Map Page displayed. The cursor flashes on the 'Map Setup' option.
2) Press the **ENT** Key. The Map Setup Menu is displayed.
3) Select the 'Land' group.
4) Press the **ENT** Key. The cursor flashes on the 'LAT/LON' field.
5) Select the desired land option.
6) Select the desired range.
7) Press the **ENT** Key to accept the selected option.
8) Press the **FMS** Knob to return to the Navigation Map Page.

NAVIGATION MAP OPERATIONS

Selecting a Map Range

Figure 5-10 Map Range Indicator

The Navigation Map can be set to 28 different range settings from 500 feet to 2000 nautical miles. The current range is indicated in the lower right corner of the Navigation Map Page and represents the **top-to-bottom distance covered by the map**. To change the map range turn the **JOYSTICK** counter-clockwise to zoom in, or clockwise to zoom out.

Decluttering the Map

The Navigation Map can be quickly "decluttered" by repeatedly pressing the **DCLTR** Softkey until the desired detail is displayed. The declutter level is displayed in the **DCLTR** Softkey and next to the Menu Option. Note that during an instrument approach, automatic decluttering takes place. Table 5-1 lists the features that are turned off at each declutter level. Note that some of the map features are automatically removed at certain zoom ranges due to the map setup configuration for each map item. "SUA" listed in the following table stands for Special Use Airspace. These are controlled airspaces, military zones, etc.

Map Features Always Displayed	No Declutter	Declutter (-1)	Declutter (-2)	Declutter (-3)
Flight Plan Route Lines	All Map features visible	River/Lakes Names Only	User Waypoints	Large Airports
Flight Plan Route Waypoints		Land/Country Text	Latitude/Longitude Grid	Medium Airports
Rivers/Lakes		Large City	VORs	Small Airports
Topography Data		Medium City	NDBs	SUA Group 3
Terrain Proximity Data		Small City	Intersections	SUA Group 4
Map Borders		Not Affected	SUA Group 0	Runway Labels
Bearing Line		Freeways	SUA Group 1	
Lightning Strike Data (when Stormscope installed)		National Highways	SUA Group 2	
Nexrad Data		Local Highways	SUA Group 5	
Traffic Symbols		Local Roads	SUA Group 6	
Traffic Labels		Local Road Labels	SUA Group 7	
		Railroads	Obstacles	
		Major Political Boundaries		

Table 5-1 Map Declutter Levels

Map Panning

Figure 5-11 Map Panning

Map panning (Figure 5-11) moves the map beyond its current limits without adjusting the map range. When the panning function is selected by pushing in the **JOYSTICK**, a map arrow flashes on the map display. A window also appears at the top of the map display showing the latitude/longitude position of the arrow, the bearing and distance to the pointer from the aircraft's present position and the elevation of the land at the position of the arrow. When the map arrow crosses an airspace boundary, the boundary is highlighted and airspace information is shown at the top of the display. The information includes the name and class of airspace, the ceiling in feet expressed in Mean Seal Level (MSL), and the floor in feet MSL.

Panning the map:

1) Push in the **JOYSTICK** to display the map arrow.
2) Move the **JOYSTICK** in the general direction of the desired destination to place the arrow at the destination location. When the arrow is placed on an object, the name of the object is highlighted (even if the name was not originally displayed on the map). This feature applies to everything displayed on the map except route lines. When any map feature or object is selected on the map display, features or objects are displayed in the box located at the top of the display. From here, the pilot can designate the waypoint as the direct-to destination. When the arrow crosses an airspace boundary, the boundary is highlighted and airspace information is displayed at the top of the display.
3) Push in the **JOYSTICK** to remove the arrow and return to the present position.

Creating user waypoints from the Navigation Map Page:

1) With the Navigation Map Page displayed, push the **JOYSTICK** to activate the panning function. The map arrow is displayed at the present aircraft position.
2) After placing the map arrow at the desired position, press the **ENT** Key. The User Waypoint Information Page is displayed with the captured position.
3) Enter a waypoint name.
4) Press the **ENT** Key to accept the selected name. The first reference waypoint field is highlighted.
5) If desired, enter the identifier of the reference waypoint and the radial and distance to the reference waypoint.
6) Press the **ENT** Key to accept.
7) Press the **FMS** Knob to remove the flashing cursor.

Displaying Topographic Data on the Map

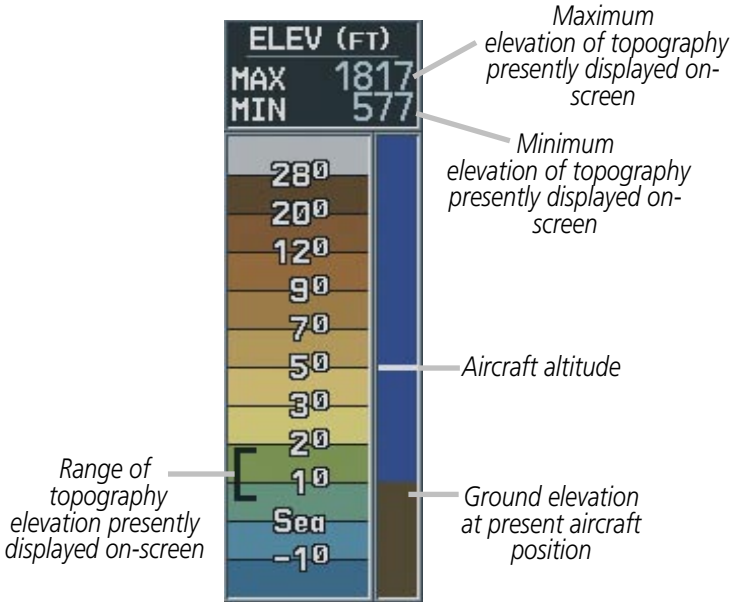


Figure 5-12 Topography Scale

The Navigation Map displays various shades of topography land colors representing the rise and fall of land elevation similar to aviation sectional charts (Figure 5-12). The Navigation Map can display a topographic range representing various Key points of terrain elevation colors with their associated elevation value labeled.

Displaying topographic data on the Navigation Map:

1) Press the **MAP** Softkey.
2) Press the **TOPO** Softkey. Topo data can also be displayed on the Navigation Map by using the 'On/Off' topo data map setup feature. See the navigation map page setup menu section for more information.
3) Press the **TOPO** Softkey again to remove topo data from the Navigation Map. When topo data is removed from the page, the Jeppesen Nav data is presented on a black background.

GPS Navigation Status Box

NOTE: *The coloration of primary, GPS-derived data is yellow when in dead reckoning mode. These primary fields include the NAV Status Box fields except Active Leg, TAS, and DTK.*

Table 5-13 GPS Navigation Status Box

The GPS Navigation Status Box (Figure 5-13) is displayed in the top center of the MFD and PFD. It displays four, user-configurable fields which can display the information listed below. Instructions on changing a data field are given in the System Overview section.

- Bearing to next waypoint (BRG)
- Distance to next waypoint (DIS)
- Desired track to next waypoint (DTK)
- Enroute safe altitude (ESA)
- Estimated Time of Arrival (ETA)
- Estimated Time Enroute (ETE)
- Ground Speed (GS)
- Maximum Safe Altitude (MSA)
- True Airspeed (TAS)
- Track angle error (TKE)
- Track angle (TRK)
- Vertical speed required (VSR)
- Cross track error (XTK)
- Currently selected MFD page title

Measuring Bearing and Distance

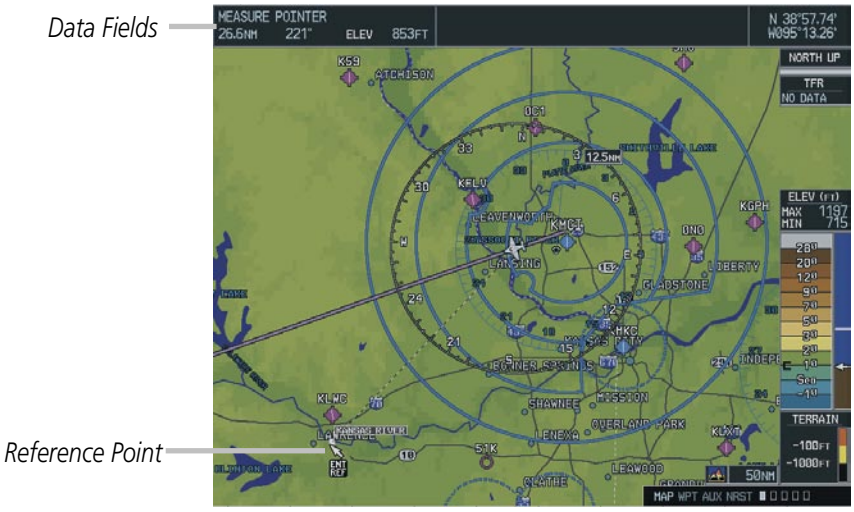


Figure 5-14 Measuring Bearing and Distance on the MFD Navigation Map

The second map setup option is 'Measure Bearing/Distance' (Figure 5-14), which provides a quick and easy method for determining the bearing and distance between any two points on the Navigation Map. Pressing the **ENT** Key at any location with the 'Measure' option enabled allows bearing and distance from the newly selected position to be acquired.

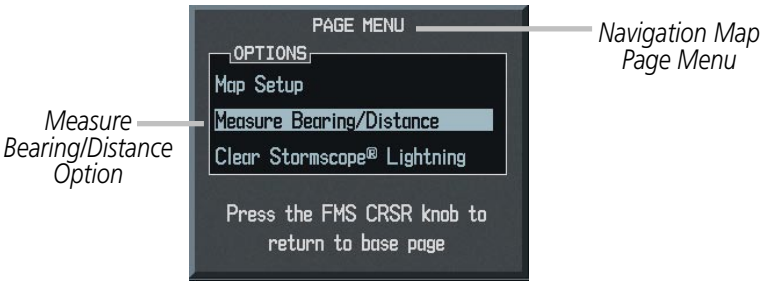


Figure 5-15 Measure Bearing/Distance Option

Measuring bearing and distance between two points:

1) Press the **MENU** Key (with the Navigation Map Page displayed).

2) Highlight the 'Measure Bearing/Distance' field.

3) Press the **ENT** Key. An on-screen reference pointer is displayed on the map display at the aircraft's present position.

4) Move the joystick to place the reference pointer at the desired location. The bearing and distance is displayed at the top of the map display. Elevation at the current position is also displayed. Pressing the **ENT** Key changes the starting point for measuring.

5) To exit the Measure Bearing/Distance option, push in the joystick or select 'Stop Measuring' from the page menu.

6) Press the **ENT** Key.

5.3 PFD INSET MAP AND WINDOWS

GPS navigation operations on the Primary Flight Display centers around the use of the Inset Map and Display Windows (Figures 5-16 and 5-17).

INSET MAP

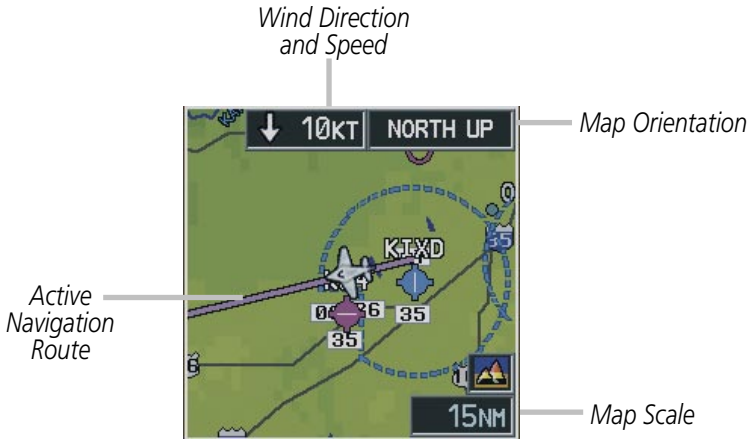


Figure 5-16 PFD Inset Map

The Inset Map is a smaller version of the MFD Navigation Map and is optionally displayed in the lower left corner of the PFD when the system is not in reversionary mode. The Inset Map is displayed by pressing the **INSET** Softkey. Inset Map features are enabled on the MFD (refer to the Navigation Map Setup section for details).

NOTE: *The Inset Map is removed from the PFD any time aircraft pitch is greater than +30° or less than –20°, or when a 65° bank angle is reached.*

NOTE: *Inset Map operations involving the display of traffic, terrain, and weather data are discussed in the Hazard Awareness section.*

The Map Inset Pop-up window can display the following information:

- Moving map
- Zoom scale legend
- Orientation
- Aircraft icon
- TOPO data
- Traffic data
- Weather data
- Terrain data
- Indication of which map features are enabled
- Active navigation flight plan

- Track vector
- Wind direction/speed
- Latitude/longitude lines
- NAV range ring
- Fuel range ring (reserve; the fuel reserve rings are enabled and disabled from the MFD only)
- Obstacles data
- Potential terrain/obstacle impact data (TAWS/TERRAIN units)

PFD WINDOWS

PFD windows are displayed in the lower right corner of the PFD. PFD windows can display different types of information, the discussion in this section of the pilot's guide is limited to the following windows that pertain to GPS navigation:

- Nearest Airports
- Direct-to
- Flight Plan
- Procedures

Figure 5-17 PFD Window Location

OPERATIONS

The following Inset Map operations can be performed (operations are performed independently of the MFD):

- Changing the zoom range
- Changing the declutter level
- Map panning
- Topo
- Traffic
- Terrain
- Stormscope
- NEXRAD
- Lightning

To change the Inset Map zoom range, turn the **joystick** clockwise to increase or counterclockwise to decrease the range. Zoom ranges from 500 feet to 2,000 nautical miles. To change the declutter level, press the **INSET** Softkey. Press the **DCLTR** Softkey to remove background map details until the desired amount of detail is displayed. The declutter level appears in the Softkey (i.e., DCLTR-1).

Panning the map:

1) Push in the **JOYSTICK** to display the map pointer. The map can now move beyond its current limits without adjusting the range.
2) Move the **JOYSTICK** to pan the map in the general direction of the desired location. When the pointer is placed on an object, the name of the object is highlighted for approximately 4 seconds (even if the name was not originally displayed on the map). This feature applies to everything displayed on the map except for route lines.
3) Push in the **JOYSTICK** to cancel the panning function and return to the present position on the map.

5.4 DIRECT-TO-NAVIGATION (MFD)

The "direct-to" navigation feature provides a quick method of setting a GPS course to a destination waypoint. Once a direct-to is activated, the G1000 establishes a point-to-point course line from the present position to the selected direct-to destination. Course guidance is provided until the direct-to is cancelled or replaced by a new destination.

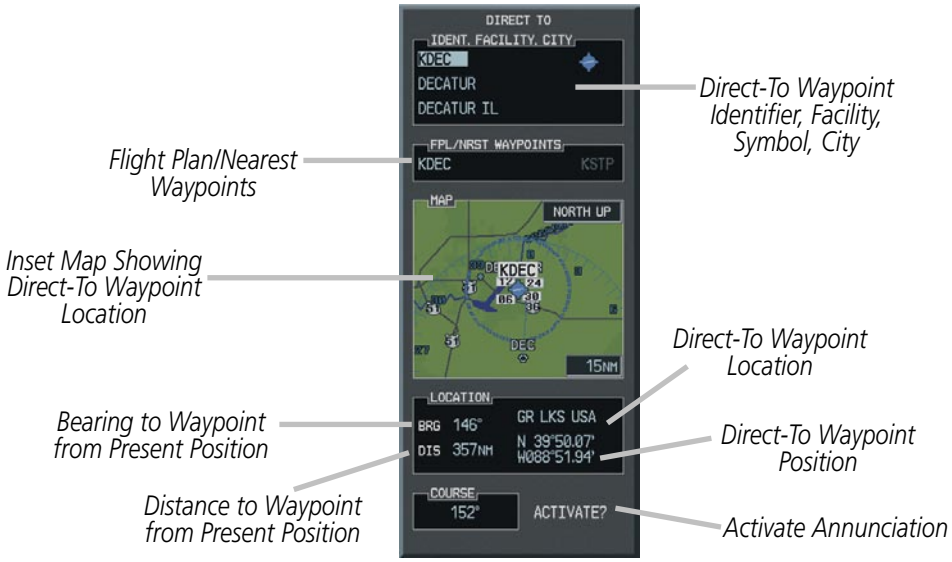


Figure 5-18 MFD Direct to Window

NOTE: *The Direct-to Window Inset Map (Figure 5-18) range is adjustable. To change the map range, turn the joystick to the left to select a lower range, turn it to the right to select a higher range.*

SELECTING A DIRECT-TO WAYPOINT

A direct-to waypoint can be selected in the following ways:

- By identifier, facility, or the name of a city
- From the active flight plan or nearest airports list
- From a waypoint field, waypoint page, or highlight shortcut

Selecting and activating a direct-to destination by entering an identifier:

1) Press the **Direct-to** (D▸) Key.
2) Enter the destination waypoint identifier (Figure 5-19).

Figure 5-19 Entering an Identifier

3) Press the **ENT** Key to confirm the identifier. The 'Activate?' field is highlighted (Figure 5-20).

Figure 5-20 Activate Field

4) Press the **ENT** Key to activate.

In addition to selecting a destination by an identifier, the Direct-to Window also allows the selection of airports, VORs and NDBs by facility or city name (Figure 5-21).

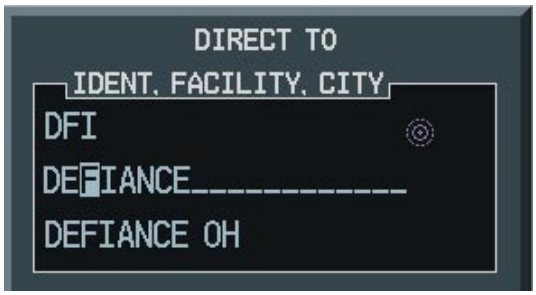


Figure 5-21 Entering a Facility Name

Selecting a direct-to destination by facility or the name of a city:

1) Press the **Direct-to** Key. The Direct-to Window is displayed with the waypoint identifier field highlighted.
2) Highlight the facility or city name field.
3) Enter the facility or city location of the desired waypoint. If duplicate entries exist for the entered facility or city name, additional entries can be viewed by turning the small **FMS** Knob during the selection process.

4) Press the **ENT** Key to confirm the selected waypoint.

5) Press the **ENT** Key to activate a direct-to.

Any waypoint contained in the flight plan can be selected as a direct-to destination from the Direct-to Waypoint Window when navigating an active flight plan.

SPECIFYING A COURSE TO A WAYPOINT

When navigating a direct-to, the G1000 sets a direct great circle course to the selected destination. The course to a destination can also be manually selected using the course field ('COURSE') on the Direct-to Waypoint Window.

Figure 5-22 Entering a Direct-to Course

Manually selecting a direct-to course:

1) Press the **Direct-to** Key. The Direct-to Window is displayed with the destination field highlighted.

2) Highlight the course field.

3) Enter the desired course (Figure 5-22).

4) Press the **ENT** Key twice to begin navigation using the selected destination and course.

5) To reselect a direct course from the present position (or select a new manually defined course) press the **Direct-to** Key. Press the **ENT** Key twice.

CANCELING DIRECT-TO NAVIGATION

Once a direct-to is activated, the G1000 provides navigation guidance to the selected destination until the direct-to is either replaced with a new direct-to or flight plan, cancelled, or when the G1000 is powered off.

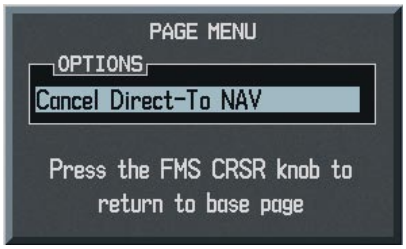


Figure 5-23 Cancel Direct-to Option

Cancelling a direct-to:

1) Press the **Direct-to** Key to display the Direct-to Window.
2) Press the **MENU** Key.
3) With 'Cancel Direct-To NAV' highlighted (Figure 5-23), press the **ENT** Key. If a flight plan is still active, the G1000 resumes navigating the flight plan along the closest leg.

DIRECT-TO NAVIGATION SHORTCUTS

A direct-to can be performed from any page displaying a single waypoint identifier (such as the Waypoint pages for airports and NAVAIDS) by simply pressing the **Direct-to** Key and the **ENT** Key. For pages that display a list of waypoints (e.g., the Nearest Airport Page), the desired waypoint must be highlighted with the cursor before pressing the **Direct-to** Key.

Direct-to destinations may also be selected from the Navigation Map Page by panning to the desired destination location, pressing the **Direct-to** Key, and then the **ENT** Key twice. If no airport, NAVAID or user waypoint exists at the desired location, a temporary waypoint named 'MAPWPT' is automatically created at the location of the map pointer.

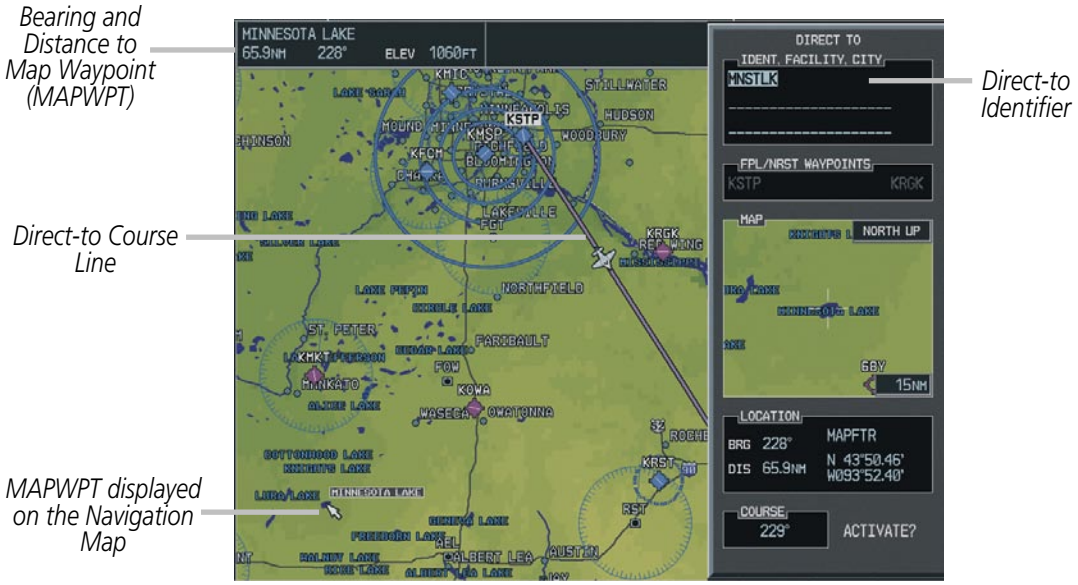


Figure 5-24 Direct-to Navigation Using Map Panning

Selecting a direct-to destination from the Navigation Map Page:

1) From the Navigation Map Page, press the **JOYSTICK** to display the map pointer.
2) Move the **JOYSTICK** to place the map pointer at the desired destination location.
3) If the map pointer is placed on an existing airport, NAVAID, or user waypoint, the waypoint name is highlighted. Press the **Direct-to** Key.
4) Press the E**NT** Key twice to navigate to the waypoint.
5) If the map pointer is placed on an open location, press the **Direct-to** Key.
6) Press the **ENT** Key twice to create a 'MAPWPT' waypoint and then navigate to it (Figure 5-24).

DIRECT-TO NAVIGATION SHORTCUTS USING THE FMS KNOB

Selecting a Direct-to Destination to a Flight Plan Waypoint:

1) While navigating an active flight plan, press the **Direct-to** (D▸) Key.
2) Turn the small **FMS** Knob to the left to display a list of flight plan waypoints as shown in Figure 5-25.

Figure 5-25 Flight Plan Waypoint List (MFD)

3) Turn the large **FMS** Knob to select the desired waypoint.
4) Press the **ENT** Key. The cursor is now displayed on 'ACTIVATE?'.
5) Press **ENT** again to activate a Direct-to.

Selecting a Direct-to Destination to a Nearest Airport:

1) Press the **Direct-to** (D▸) Key.
2) Turn the small **FMS** Knob to the left. Initially, a flight plan waypoint list is displayed as in Figure 5-26. The list is populated only when navigating a flight plan.

Figure 5-26 Nearest Airport List (MFD)

3) Turn the small **FMS** Knob to the right to display the 'NRST' airports to the aircraft's current position as shown in Figure 5-26.
4) Turn the large **FMS** Knob to select the desired airport.
5) Press the **ENT** Key. The cursor is now displayed on 'ACTIVATE?'.
6) Press **ENT** again to activate a Direct-to.

Selecting a Direct-to Destination to a Recently Entered Identifier:

1) Press the **Direct-to** (D▸) Key.
2) Turn the small **FMS** Knob to the left. Initially, a flight plan waypoint list is displayed as in Figure 5-27. The list is populated only when navigating a flight plan.

Figure 5-27 Recently Entered Waypoints List (MFD)

3) Turn the small **FMS** Knob to the right to display the 'RECENT' waypoints as shown in Figure 5-27.
4) Turn the large **FMS** Knob to select the desired airport.
5) Press the **ENT** Key. The cursor is now displayed on 'ACTIVATE?'.
6) Press **ENT** again to activate a Direct-to.

5.5 DIRECT-TO-NAVIGATION (PFD)

NOTE: *Section 5.3 describes the PFD Inset Map and PFD Windows. It is recommended that the user read this section before beginning GPS navigation operations on the PFD.*

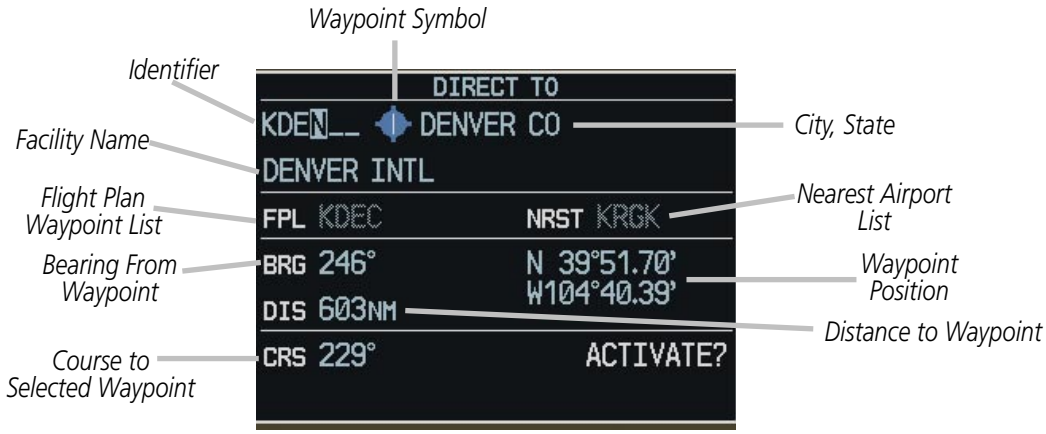


Figure 5-28 PFD Direct-to Window

OPERATIONS

A direct-to waypoint can be selected in the following ways:

- By identifier, waypoint location or facility name
- From a list of waypoints in the active flight plan
- From a list of 25 nearest airports

The PFD Direct-to window is enabled and disabled by pressing the **Direct-to** Key (D▸). The currently selected waypoint displays the information shown in Figure 5-28.

Direct-to Navigation from the PFD

1) Press the **Direct-to** Key (D▸).
2) Turn the large **FMS** Knob to place the cursor in the desired selection field.
3) Turn the small **FMS** Knob to begin selecting the desired identifier, location, etc.
4) Press the **ENT** Key.
5) The cursor is now flashing on 'ACTIVATE?'. If no altitude constraint or course is desired, press the **ENT** Key to activate.

11) Turn the small **FMS** Knob to enter the desired target altitude offset from the selected Direct-to.

12) Press the **ENT** Key to highlight 'Activate?' or turn the large **FMS** Knob to highlight the 'COURSE' field.

13) Turn the small **FMS** Knob to enter the desired course to the waypoint.

14) Press the **ENT** Key to highlight 'ACTIVATE?'.

15) Press the **ENT** Key again to activate the Direct-to.

Selecting a direct-to by city or facility name:

1) Press the **Direct-to** Key.

2) Highlight the city field (to the right of the identifier) or facility field (directly below the identifier) field.

3) Enter the city (to the right of the identifier field) or the facility (directly below the identifier field).

4) Once the desired city or facility name is displayed, press the **ENT** Key to confirm the selection.

5) Press the **ENT** Key to activate the direct-to.

Selecting a direct-to from a list of waypoints in an active flight plan:

1) Press the **Direct-to** Key.

2) Highlight the FPL field.

3) Turn the small **FMS** Knob to display a selection window showing all waypoints in the active flight plan.

4) Scroll through the list and highlight the desired waypoint.

5) Press the **ENT** Key twice to activate the direct-to.

Selecting a direct-to from the nearest airports list:

1) Press the **Direct-to** Key.
2) Highlight the NRST field.
3) Turn the small **FMS** Knob to display a selection window showing the 25 nearest airports.
4) Scroll through the list and highlight the desired airport.
5) Press the **ENT** Key twice to activate the direct-to.

Selecting a specific course to a waypoint:

1) Press the **Direct-to** Key.
2) Enter the desired destination waypoint
3) Press the **ENT** Key.
4) Highlight the 'CRS' field.
5) Enter the desired course.
6) Press the **ENT** Key twice to activate the direct-to using the selected course to the destination.

Cancelling a direct-to:

1) Press the **Direct-to** Key.
2) Press the **MENU** Key to display the Direct-to Menu.
3) Press the **ENT** Key to cancel direct-to navigation. If a flight plan is still active, the G1000 resumes navigating the flight plan along the closest leg of flight.

5.6 AIRPORT INFORMATION (MFD)

Figure 5-29 Airport Information Page

OPERATIONS

Selecting the Airport Information Page (Figure 5-29):

1) Select the 'WPT' page group.

2) Select the first rectangular page icon.

Selecting an airport by identifier, facility name, or city location:

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.

2) Select the identifier, facility name or city location field.

3) Enter the desired identifier, facility name, or city location.

4) Press the **ENT** Key.

5) To remove the flashing cursor, press the **FMS** Knob.

DUPLICATE WAYPOINTS

As an identifier, facility name or location is entered, the G1000's Spell'N'Find™ feature scrolls through the database, displaying those waypoints matching the characters which have been entered to that point. If duplicate entries exist for the entered facility name or location, additional entries may be viewed by continuing to turn the small **FMS** Knob during the selection process. If duplicate entries exist for an entered identifier, a duplicate waypoint appears once you select the identifier (Figure 5-30).

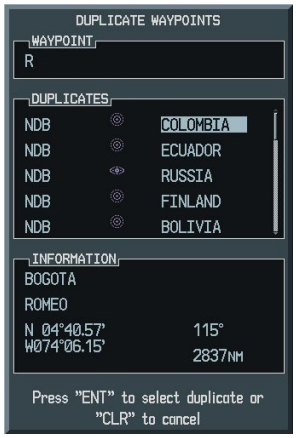


Figure 5-30 Duplicate Waypoints

Loading a frequency in the standby COM or NAV window:

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.

2) Move the cursor to the Frequencies Box.

3) Turn the **FMS** Knob to scroll through the list, placing the cursor on the desired frequency. If a listed frequency has additional information for the pilot to view, the frequency is preceded by an info ('i') designation. Press the **ENT** Key to view the information. The following may be displayed with the frequency:

- 'TX' – transmit only
- 'RX' – receive only
- 'PT' – part time frequency
- 'i' – additional information exists, press the **ENT** Key

4) Press the **ENT** Key to place the selected frequency in the standby field of the COM or NAV window.

5) Press the **FMS** Knob to remove the cursor.

The Airport Frequencies field uses the descriptions and abbreviations listed in Table 5-2:

Communication Frequencies Which May Include Additional Information	Communication Frequencies Without Additional Information	Navigation Frequencies
Approach	ATIS	ILS
Arrival	ASOS	LOC
Class B	AWOS	
Class C	Center	
CTA	Clearance	
Departure	Gate	
TMA	Control	
Terminal	Ground	
TRSA	Helicopter	
	Multicom	
	Pre-Taxi	
	Radar	
	Ramp	
	Other	
	Tower	
	Unicom	

Table 5-2 Frequency Descriptions and Abbreviations

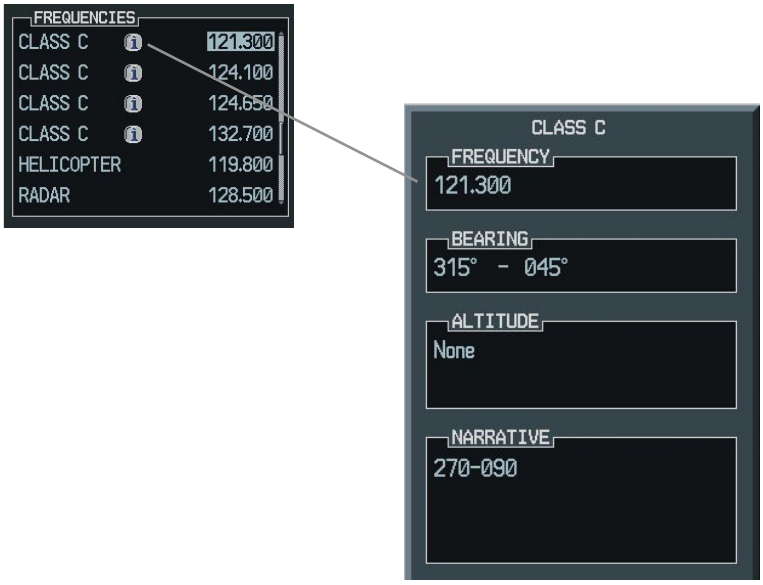


Figure 5-31 Viewing a Restriction

Loading a pilot control lighting frequency into selected COM standby frequency:

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Move the cursor to the 'PCL FREQ' field in the Runways Window.
3) Press the **ENT** Key to place the PCL frequency in the standby field of the COM window.
4) Press the **FMS** Knob to remove the cursor.

ADDITIONAL AIRPORT RUNWAY INFORMATION

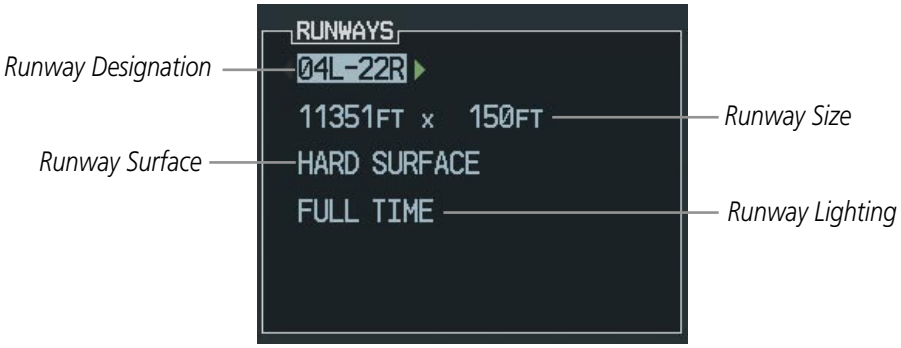


Figure 5-32 Runway Information Box

The airport runway information field (Figure 5-32) displays runway designations, length, surface type and lighting for the selected airport. A map image of the runway layout and surrounding area is also displayed on the Airport Information Window. The map image range is displayed in the lower left corner and is adjustable using the joystick. For airports with multiple runways, information for each runway is available.

Displaying information for each additional runway:

1) Press the **FMS** Knob to activate the cursor.
2) Place the cursor on the runway designation field.
3) Turn the small **FMS** Knob to display the next runways for the selected airport.
4) Select the desired runway.
5) Press the **FMS** Knob to remove the flashing cursor.
6) Turn the **JOYSTICK** counterclockwise to select a lower range and rotate it clockwise to select a higher range.

The following descriptions and abbreviations are used on the airport runway information box:

- Type – Usage type: Public, Military, or Private
- Surface – Runway surface types include: Hard, Turf, Sealed, Gravel, Dirt, Soft, Unknown, or Water
- Lighting – Runway lighting types include: No Lights, Part Time, Full Time, Unknown, or Frequency (for pilot-controlled lighting)

Selecting a Runway:

1) With the Airport Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Place the cursor on the 'RUNWAYS' identifier field.
3) Turn the small **FMS** Knob to display the next runway for the selected airport. Continue turning the small **FMS** Knob to select the desired runway.
4) To remove the flashing cursor, press the **FMS** Knob.

Creating user waypoints via the Airport Information Page Map:

1) With the Airport Information Page displayed, push the **JOYSTICK** to activate the panning function. The target pointer is displayed at the center of the map.
2) After placing the pointer at the desired position, press the **ENT** Key. The User Waypoint Information Page is now displayed with the captured position.
3) Enter a waypoint name.
4) Press the **ENT** Key to accept the selected name. The first reference waypoint field is highlighted.
5) If desired, enter the identifier of the reference waypoint and the radial and distance to the reference waypoint.
6) Press the **ENT** Key to accept.
7) Press the **FMS** Knob to remove the flashing cursor.

5.7 INTERSECTION INFORMATION (MFD)

NOTE: *The VOR displayed on the Intersection Information Page is the nearest VOR, not necessarily the VOR used to define the intersection.*

OPERATIONS

Selecting the Intersection Information Page:

1) Select the WPT page group.
2) Select the second rectangular page icon. To change the map range, turn the joystick to the left to select a lower range, turn it to the right to select a higher range. Intersections can only be selected by identifier.

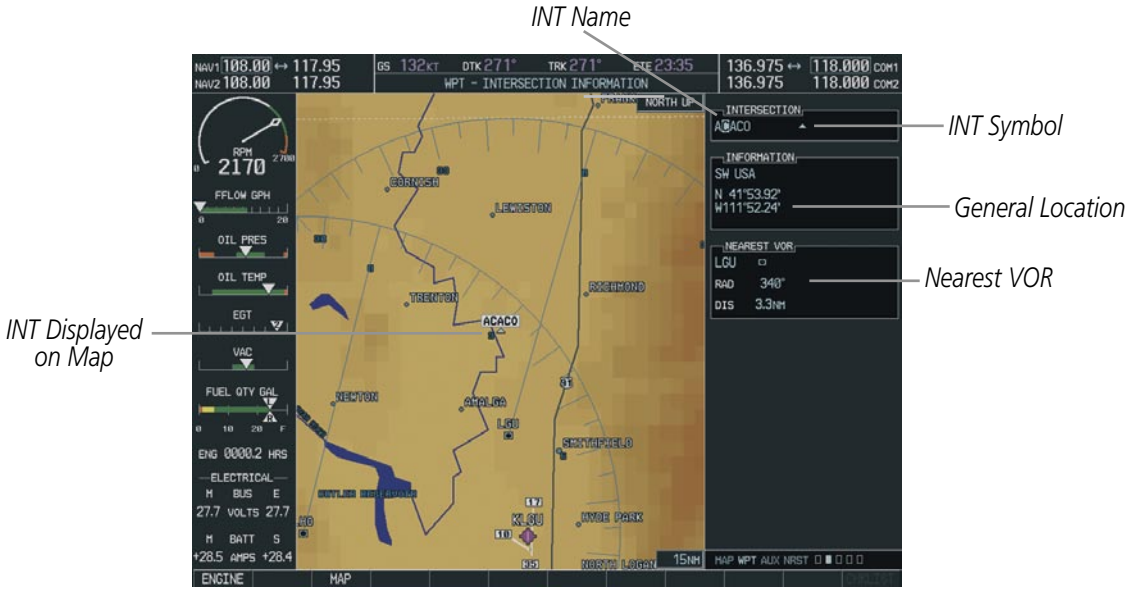


Figure 5-33 Intersection Information Page

Selecting an intersection:

1) With the Intersection Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Enter a name for the identifier.
3) Press the **ENT** Key.
4) Press the **FMS** Knob to remove the flashing cursor.

5.8 NDB INFORMATION (MFD)

OPERATIONS

Selecting the NDB Information Page:

1) Select the WPT page group.
2) Select the third rectangular page icon.

NOTE: Compass locator (LOM): a low power, low or medium frequency radio beacon installed in conjunction with the instrument landing system. When LOM is used, the locator is at the Outer Marker; when LMM is used, the locator is at the Middle Marker.

Figure 5-34 NDB Information Page

Selecting a specific NDB:

1) With the NDB Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Highlight the desired selection field (identifier, name or closest city).
3) Enter an identifier, name or city.
4) Press the **ENT** Key.
5) Press the **FMS** Knob to remove the flashing cursor.

If duplicate identifiers occur, a Duplicate Waypoints Menu pops up, from which the desired waypoint can be selected. When scrolling through the closest cites list to select an NDB, a city may appear more than once, depending on the number of NDBs near it.

5.9 VOR INFORMATION (MFD)

OPERATIONS

Selecting the VOR Information Page (Figure 5-35):

1) Select the WPT page group.
2) Select the fourth rectangular page icon.

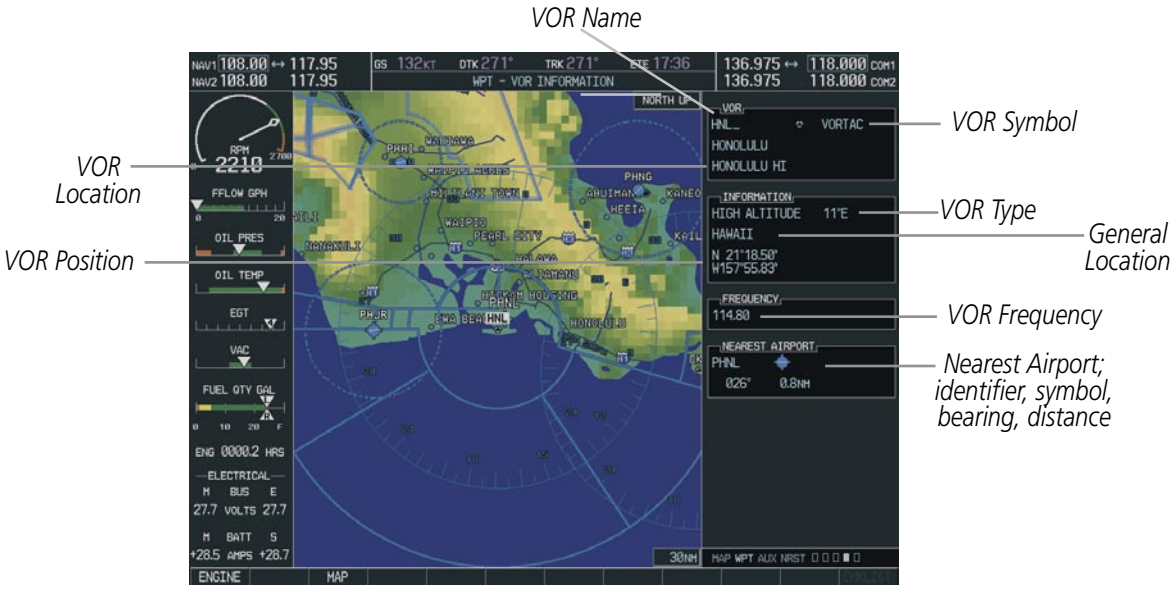


Figure 5-35 VOR Information Page

Selecting a VOR:

1) With the VOR Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Highlight the desired selection field (identifier, name or closest city).
3) Enter an identifier, name or city.
4) Press the **ENT** Key.
5) Press the **FMS** Knob to remove the flashing cursor.

5.10 USER WAYPOINT INFORMATION (MFD)

OPERATIONS

Selecting the User WPT Information Page (Figure 5-36):

1) Select the NRST page group.
2) Select the fifth rectangular page icon.

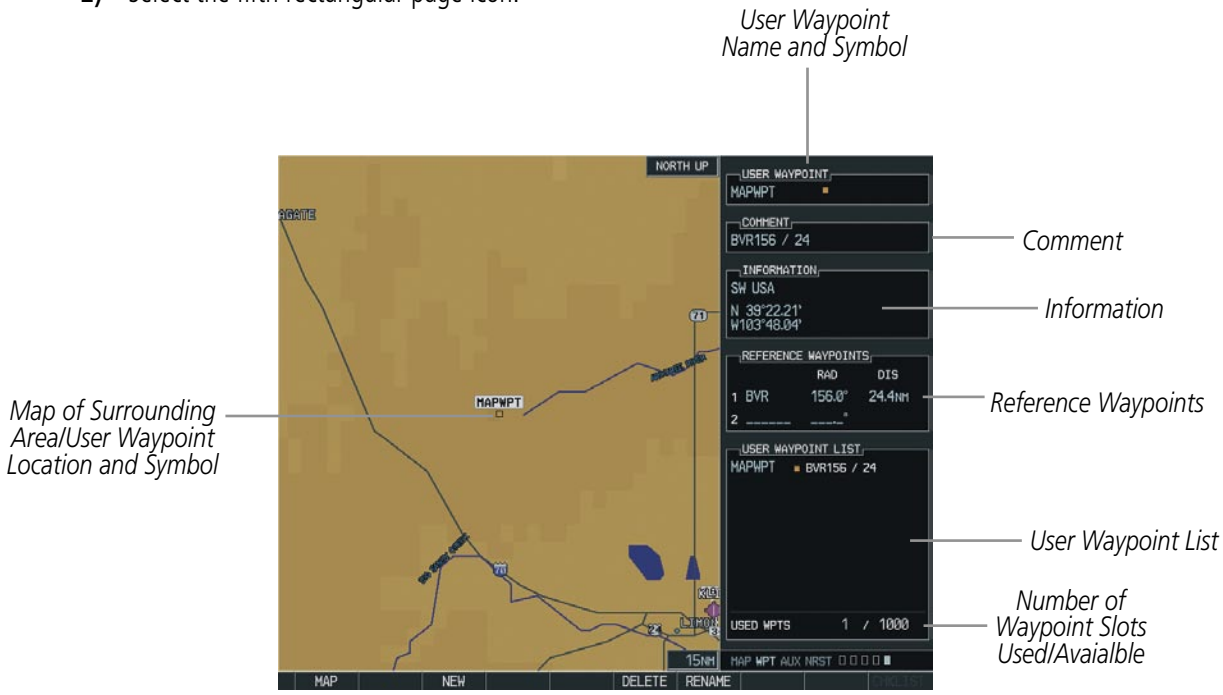


Figure 5-36 User WPT Information Page

Creating User Waypoints

User waypoints may be created from the User Waypoint Information Page or the Navigation Map Page. To create a new user waypoint from the User Waypoint Information Page, enter the name (identifier) and position, or reference another waypoint by radial and distance.

Creating a new user waypoint:

1) With the User Waypoint Information Page displayed, press the **FMS** Knob to activate the cursor.
2) Enter a name for the new waypoint.
3) Press the **ENT** Key. The message 'Are you sure you want to create the new user waypoint' is displayed.
4) With 'YES' highlighted, press the **ENT** Key.
5) Highlight the latitude/longitude field or the Reference Waypoints field, depending on how the waypoint is to be defined.
6) Enter the position coordinates or the radial and distance from the reference waypoint.

7) Press the **ENT** Key to accept the new waypoint.

8) Press the **FMS** Knob to remove the flashing cursor.

Creating user waypoints from the Navigation Map Page:

1) With the Navigation Map Page displayed, push the **JOYSTICK** to activate the panning function. The map arrow is displayed at the present aircraft position.

2) After placing the pointer at the desired position, press the **ENT** Key. The User Waypoint Information Page is now displayed with the captured position.

3) Enter a waypoint name.

4) Press the **ENT** Key to accept the selected name. The first reference waypoint field is highlighted.

5) If desired, enter the identifier of the reference waypoint and the radial and distance to the reference waypoint.

6) Press the **ENT** Key to accept.

7) Press the **FMS** Knob to remove the flashing cursor.

Modifying a user waypoint:

1) With the User Waypoint Information Page displayed, press the **FMS** Knob to activate the cursor.

2) Move the cursor to the desired field.

3) Turn the small **FMS** Knob to make changes.

4) Press the **ENT** Key to accept the changes.

5) Press the **FMS** Knob to remove the flashing cursor.

Deleting a user waypoint:

1) Select the User Waypoint Information Page.
2) Press the **MENU** key to display the User Waypoint Information Page options or press the **DELETE** Softkey.
3) Select 'Delete User Waypoint'.
4) Press the **ENT** Key. The message 'Would you like to delete the user waypoint' is displayed.
5) With 'YES' highlighted, press the **ENT** key.

Deleting all user waypoints:

1) Select the User Waypoint Information Page.
2) Press the **MENU** Key.
3) Select 'Delete All User Waypoints'
4) Press the **ENT** key. A confirmation windows is displayed.
5) Press the **ENT** Key to accept 'YES' or highlight 'NO'.
6) Press the **ENT** Key.

'Present Position' when selected will move the currently selected user waypoint to the present position of the aircraft. The user waypoint is set to the airplane's position at the time when the option was selected.

Moving the currently selected user waypoint to the present position of the aircraft:

1) Select the User Waypoint Information Page and press the **MENU** Key.
2) Ensure waypoint is selected.
3) Select 'Use Present Position'.
4) Press the **ENT** Key.
5) Highlight the position and press the **ENT** Key.

'Auto Comment', when selected, will overwrite the currently selected user waypoint comment with an automatically generated comment. Auto comments are in the same format as comments that are generated for user waypoints that have not specified unique user waypoint comments. The auto comment can be one of three styles:

- REF1BRG1 / DIS1 - if the user waypoint position is defined by a reference 1 waypoint radial and distance (this is generally the default case, but the default case could also be the blank case if there are no reference waypoints near the user waypoints position.
- REF1BRG1 / REF2BRG2 - if the user waypoint position is defined by a reference 1 waypoint radial and a reference 2 waypoint radial
- BLANK - if no reference waypoints are near the user waypoints position

Overwriting the currently selected user waypoint's comment with an automatically generated comment:

1) Select the desired waypoint on the User Waypoint Information Page.
2) Press the **MENU** Key. Select 'Auto Comment'.
3) Press the **ENT** Key.

'Rename User Waypoint' renames a user waypoint.

Renaming a user waypoint:

1) Select the User Waypoint Information Page.
2) Press the **MENU** Key (select 'Rename User Waypoint' and press the **ENT** Key) or press the **RENAME** Softkey.
3) The user waypoint field is highlighted. Rename the user waypoint.
4) Press the **ENT** Key.
5) The message 'Would you like to rename the user waypoint' is displayed. Select 'YES' to rename the new user waypoint.

5.11 NEAREST AIRPORTS (MFD)

OPERATIONS

Selecting the Nearest Airports Page (Figure 5-37):

1) Select the 'NRST' page group.

2) Select the first rectangular page icon.

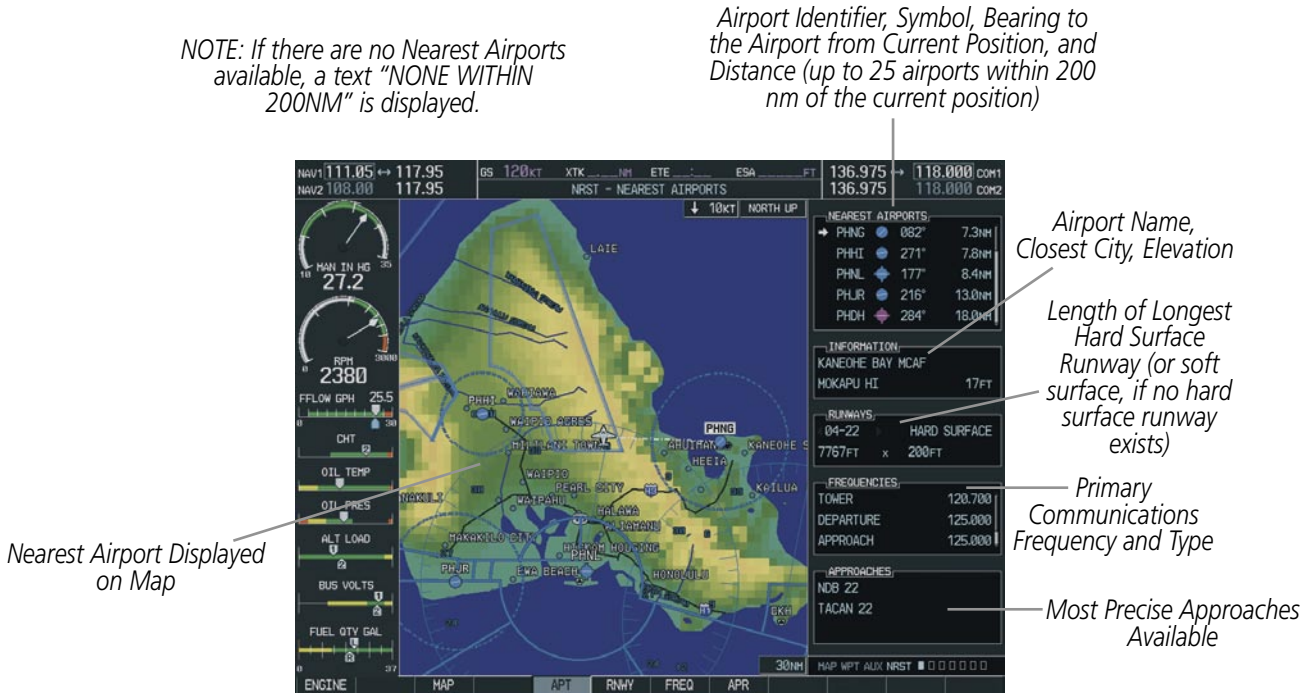

NOTE: If there are no Nearest Airports available, a text "NONE WITHIN 200NM" is displayed.
Airport Identifier, Symbol, Bearing to the Airport from Current Position, and Distance (up to 25 airports within 200 nm of the current position)
Airport Name, Closest City, Elevation
Length of Longest Hard Surface Runway (or soft surface, if no hard surface runway exists)
Primary Communications Frequency and Type
Most Precise Approaches Available
Nearest Airport Displayed on Map
NRST - NEAREST AIRPORTS
NEAREST AIRPORTS
INFORMATION
RUNWAYS
FREQUENCIES
APPROACHES
KANEOHE BAY MCAF
HARD SURFACE
TOWER 120.700
DEPARTURE 125.000
APPROACH 125.000
NDB 22
TACAN 22
MAP
APT
RNWY
FREQ
APR

Figure 5-37 Nearest Airports Page

Selecting a nearest airport:

1) With the Nearest Airport Page displayed, press the **FMS** Knob to activate the cursor.
2) Turn the **FMS** Knob to select the desired nearest airport.

Accessing information for a specific airport:

1) With the Nearest Airports Page displayed, press the **APT** Softkey or press the **FMS** Knob to place the cursor in the 'NEAREST AIRPORTS' field. The first airport in the nearest airports list is highlighted.

2) Press the **FMS** Knob.

3) Highlight the desired airport.

4) Press the **FMS** Knob to remove the flashing cursor.

OR:

1) With the Nearest Airports Page displayed, press the **MENU** Key (Figure 5-47).

2) Select the option 'Select Airport Window' and press the **ENT** Key. The cursor is placed in the 'NEAREST AIRPORTS' field.

3) Highlight the desired airport.

4) Press the **FMS** Knob to remove the flashing cursor.

Accessing runway information for the selected airport:

1) With the Nearest Airports Page displayed, press the **RNWY** Softkey to place the cursor in the 'RUNWAYS' field.

2) Select the desired runway.

3) Press the **FMS** Knob to remove the flashing cursor.

OR:

1) With the Nearest Airports Page displayed, press the **MENU** Key.

2) Select the option 'Select Runway Window' and press the **ENT** Key. The cursor is placed in the 'RUNWAYS' field.

3) Select the desired runway.

4) Press the **FMS** Knob to remove the flashing cursor.

Quickly tuning the COM transceiver to a nearby airport frequency:

1) With the Nearest Airports Page displayed, press the **FREQ** Softkey to place the cursor in the 'FREQUENCIES' field.

2) Turn either **FMS** Knob to select the desired frequency.

3) Press the **ENT** Key. The selected frequency is placed in the COM standby frequency tuning box.

4) Press the **FREQUENCY TRANSFER** Key to place the frequency in the active field.

5) Press the **FMS** Knob to remove the flashing cursor.

OR:

Quickly tuning the COM transceiver to a nearby airport frequency:

1) With the Nearest Airports Page displayed, press the **MENU** Key.
2) Select the option 'Select Frequency Window' and press the **ENT** Key. The cursor is placed in the 'FREQUENCIES' field
3) Turn the **FMS** Knob to select the desired frequency.
4) Press the **ENT** Key. The selected frequency is placed in the COM standby frequency tuning box.
5) Press the **FREQUENCY TRANSFER** Key to place the frequency in the active field.
6) Press the **FMS** Knob to remove the flashing cursor.

Figure 5-38 Nearest Airport Page Menu

5.12 NEAREST INTERSECTIONS (MFD)

OPERATIONS

Selecting the Nearest Intersections Page (Figure 5-39):

1) Select the NRST page group. 'NRST' is displayed in the page group icon located in the lower right corner of the display.

2) Select the Nearest Intersections Page, the second page in the group.

Figure 5-39 Nearest Intersections Page

Selecting a nearest intersection from the Nearest Intersections Page:

1) Press the **FMS** Knob to activate the cursor.

2) Select the desired intersection. The information on the Nearest intersection Page pertains to the selected intersection.

5.13 NEAREST NDB (MFD)

OPERATIONS

Selecting the Nearest NDB Page (Figure 5-40):

1) Select the NRST page group. 'NRST' is displayed in the page group icon located in the lower right corner of the display.
2) Select the Nearest NDB Page, the third page in the group.

Figure 5-40 Nearest NDB Page

Selecting an NDB from the Nearest NDB Page:

1) Press the **FMS** Knob to activate the cursor.
2) Select the desired NDB. The information on the Nearest NDB Page pertains to the selected NDB.

5.14 NEAREST VOR (MFD)

OPERATIONS

Selecting the Nearest VOR Page (Figure 5-41):

1) Select the 'NRST' page group.

2) Select the fourth rectangular page icon.

Figure 5-41 Nearest VOR Page

Selecting a nearest VOR:

1) With the Nearest VOR Page displayed, press the **FMS** Knob to activate the cursor.

2) Turn the **FMS** Knob to select the desired nearest VOR.

OR:

1) With the Nearest VOR Page displayed, press the **VOR** Softkey to place the cursor in the 'NEAREST VOR' window.

2) Turn the **FMS** Knob to select a VOR.

3) Press the **FMS** Knob to remove the flashing cursor.

Selecting and loading a VOR frequency:

1) With the Nearest VOR Page displayed, press the **FREQ** Softkey to highlight the VOR frequency in the 'FREQUENCY' field.
2) Press the **ENT** Key. The selected VOR frequency is placed in the NAV standby frequency box.
3) Press the **FMS** Knob to remove the flashing cursor.

Accessing information for a specific VOR:

1) With the Nearest VOR Page displayed, press the **MENU** Key (Figure 5-42).
2) Select the option 'Select VOR Window' and press the **ENT** Key. The cursor is placed in the 'NEAREST VOR' field.
3) Highlight the desired VOR.
4) Press the **FMS** Knob to remove the flashing cursor.

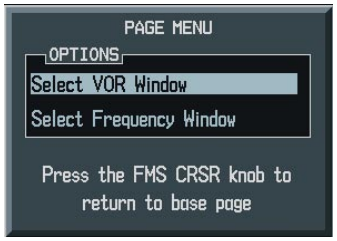


Figure 5-42 Nearest VOR Page Menu

OR:

1) With the Nearest VOR Page displayed, press the **MENU** Key.
2) Select the option 'Select Frequency Window' and press the **ENT** Key. The cursor is placed in the 'FREQUENCY' field.
3) Select the desired frequency.
4) Press the **FMS** Knob to remove the flashing cursor.

5.15 NEAREST USER WAYPOINT (MFD)

OPERATIONS

Selecting the Nearest User Waypoint Page (Figure 5-43):

1) Select the 'NRST' page group.

2) Select the fifth rectangular page icon.

Figure 5-43 Nearest User Waypoint Page

The User Waypoint Page (Figure 5-43) displays a list of up to the 25 nearest user waypoints that are within 200 nm of the aircraft's present position. Each list item includes the identifier, icon, bearing and distance to the user waypoint from the current position. An arrow before the identifier indicates the selected user waypoint. Up to eleven user waypoints are visible at a time. If more than eleven are available, there is ascroll bar that is availble. If less than eleven, the unused area matches the background color and the scroll bar is not be visible. If there are no user waypoints in the list, text indicating that there are no nearest user waypoints is displayed.

Information about the selected user waypoint includes the user comment and location (latitude and longitude). If there are no user waypoints, the user comment is blank and the position data is dashed. Reference Waypoints for the selected user waypoint are those specified when the user waypoint was created. If there is only one valid reference waypoint, the bearing and distance from the reference waypoint is stated and the second reference waypoint information is dashed. If there are no user waypoints or no valid reference waypoints, the reference waypoint fields are dashed. If there are two valid reference waypoints, the bearings from the reference waypoints are stated and the first reference waypoint's distance field is dashed.

A map of the currently selected user waypoint and surrounding data is displayed which at a minimum shows the selected user waypoint and the current aircraft position. A line is drawn between the current position and the selected user waypoint.

Selecting a nearest user waypoint:

1) With the Nearest User Waypoint Page displayed, press the **FMS** Knob to activate the cursor. If any previously entered User Waypoints are within 200 nm, these will be displayed with the closest waypoint listed first.

2) Turn the **FMS** Knob to select the desired waypoint. The remaining information on the Nearest User Waypoint Page pertains to the selected Nearest User Waypoint.

3) Press the **FMS** Knob to remove the flashing cursor.

5.16 NEAREST FREQUENCIES (MFD)

OPERATIONS

Selecting the Nearest Frequencies Page (Figure 5-44):

1) Select the 'NRST' page group.

2) Select the sixth rectangular page icon.

Figure 5-44 Nearest Frequencies Page

The Nearest Frequencies Page (Figure 5-52) displays a list of nearest ARTCCs. Only one ARTCC in the list is viewable at any given time and the user is able to change the currently viewed ARTCC. For each ARTCC the bearing, distance, and relevant frequencies are displayed. If there are more than two frequencies for any ARTCC then they are displayed inside of a scrollable list box with only two visible at any given time.

A list of nearest FSSs is displayed with only one FSS in the list viewable at any given time and the user is able to change the currently viewed FSS. For each FSS the bearing, distance, and relevant frequencies are displayed. If there is a NAV frequency for the given FSS then it is displayed in the list with its corresponding identifier so as to differentiate it from COM frequencies. If there are more than two frequencies of any type for a certain FSS then they are displayed inside of a scrollable list box with only two visible at any given time.

A list of nearest weather stations is displayed in a scrollable list box with a maximum of eight stations viewable at any time. Each line displays the call letters, type, and frequency of the given weather station.

A map of the currently selected item (ARTCC, FSS or weather station) and surrounding data, is displayed with a line between it and the current position. If there is no database loaded or if there are no stations in range, then any or all of the lists may be empty with the display indicating as such.

Selecting a nearest ARTCC and frequency:

1) With the Nearest Frequencies Page displayed, press the **FMS** Knob to activate the cursor.
2) Turn the small **FMS** Knob to select the desired nearest ARTCC.
3) Turn the large **FMS** Knob to select the desired ARTCC frequency.
4) Press the **ENT** Key to load the frequency into the COM frequency standby field.

OR:

1) With the Nearest ARTCC Page displayed, press the **ARTCC** Softkey to place the cursor in the 'NEAREST ARTCC' window.
2) Turn the small **FMS** Knob to select the desired nearest ARTCC.
3) Turn the large **FMS** Knob to select the desired ARTCC frequency.
4) Press the **ENT** Key to load the frequency into the COM frequency standby field.

OR:

1) With the Nearest Frequencies Page displayed, press the **MENU** Key (Figure 5-45).
2) Select the option 'Select ARTCC Window' and press the **ENT** Key. The cursor is placed in the 'NEAREST ARTCC' field.
3) Turn the small **FMS** Knob to select the desired nearest ARTCC.
4) Turn the large **FMS** Knob to select the desired ARTCC frequency.
5) Press the **ENT** Key to load the frequency into the COM frequency standby field.

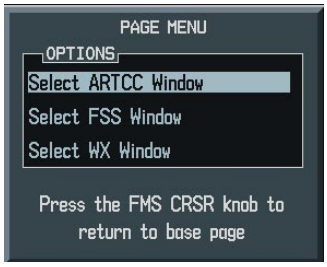


Figure 5-45 Nearest Frequencies Page Menu

Selecting a nearest FSS and frequency:

1) With the Nearest ARTCC Page displayed, press the **FSS** Softkey to place the cursor in the 'NEAREST FSS' window.

2) Turn the small **FMS** Knob to select the desired nearest FSS.

3) Turn the large **FMS** Knob to select the desired FSS frequency.

4) Press the **ENT** Key to load the frequency into the COM frequency standby field.

OR:

1) With the Nearest ARTCC Page displayed, press the **MENU** Key.

2) Select the option 'Select FSS Window' and press the **ENT** Key. The cursor is placed in the 'NEAREST FSS window.

3) Turn the small **FMS** Knob to select the desired nearest FSS.

4) Turn the large **FMS** Knob to select the desired FSS frequency.

5) Press the **ENT** Key to load the FSS frequency into the COM frequency standby field.

Selecting a nearest weather frequency:

1) With the Nearest Frequencies Page displayed, press the **WX** Softkey to highlight the frequency in the 'WX FREQUENCY' field.

2) Turn the **FMS** Knob to select the desired weather frequency.

3) Press the **ENT** Key. The selected weather frequency is placed in the COM standby frequency box.

4) Press the **FMS** Knob to remove the flashing cursor.

OR:

1) With the Nearest ARTCC Page displayed, press the **MENU** Key.

2) Select the option 'Select WX Window' and press the **ENT** Key. The cursor is placed in the 'NEAREST WX window.

3) Turn the **FMS** Knob to select the desired nearest WX frequency.

4) Press the **ENT** Key to load the WX frequency into the COM frequency standby field.

5) Press the **FMS** Knob to remove the flashing cursor.

5.17 NEAREST AIRSPACES (MFD)

The G1000 alerts the pilot to as many as nine controlled or special use airspaces (three at the most at one time) near or in the flight path. The airspace name, class, controlling agency, vertical limits and associated frequencies are displayed for the selected airspace.

NOTE: *Softkeys and page menu options are the method for the user to switch between the airspace alerts box and the frequencies box, with the airspace alerts box being the default. The selection of these options are mutually exclusive and only one list is actively selectable at any given time. The ALERTS softkey is always displayed. If the ALERTS softkey is pressed then the airspace alerts box becomes active and open to user selection.*

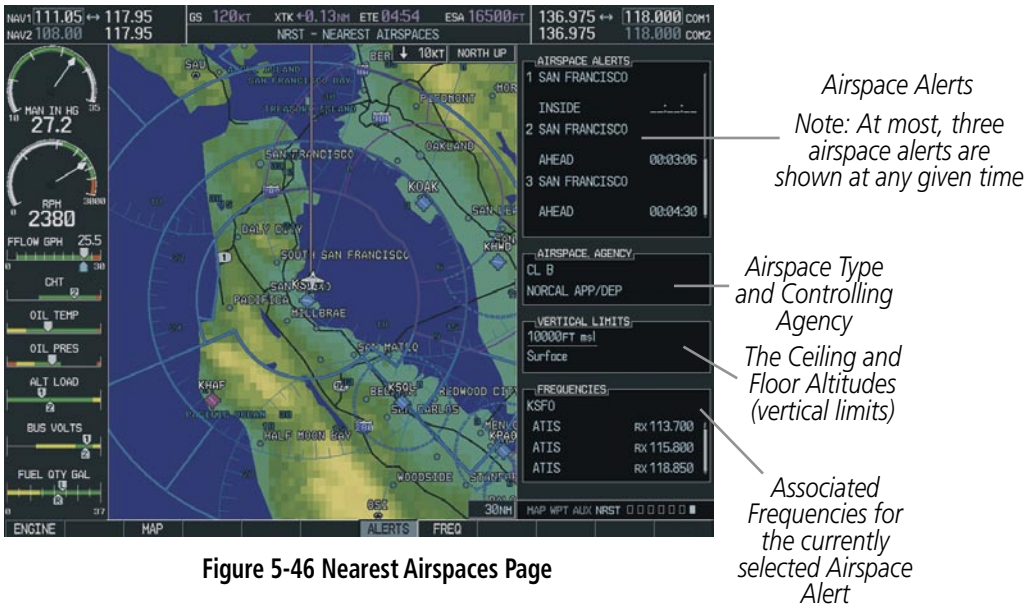


Figure 5-46 Nearest Airspaces Page

Selecting and viewing an Airspace Alert with its associated information:

1) Select the Nearest Airspace Page by selecting the 'NRST;' page group and then select the seventh page in the group.
2) Press the **ALERTS** Softkey to place the cursor in the 'AIRSPACE ALERTS' box (Figure 5-46).
3) Select the desired airspace.
4) Press the **FMS** Knob to remove the flashing cursor.

OR:

1) With the Nearest Airspace Page displayed, press the **MENU** Key.
2) Highlight 'Select Alerts Window'.
3) Press the **ENT** Key. The cursor is placed in the 'AIRSPACE ALERTS' Box.
4) Select the desired airspace.
5) Press the **FMS** Knob to remove the flashing cursor.

OR:

1) With the Nearest Airspace Page displayed, press the **FMS** Knob. The cursor is placed in the 'AIRSPACE ALERTS' Box.
2) Select the desired airspace.
3) Press the **FMS** Knob to remove the flashing cursor.

GENERAL NOTES ON AIRSPACE ALERTS

Once an airspace alert has been selected, associated information concerning the specific airspace is provided. The information includes Airspace Name, Status, and Time to Entry. The status and time to entry (if applicable) are based on the following conditions:

- If the projected course will take the aircraft inside an airspace within the next ten minutes, the status field shows the airspace as 'Ahead'.
- If the aircraft is within two nautical miles of an airspace and the current course will take the aircraft inside, the status field shows the airspace as 'Ahead < 2 nm'.
- If the aircraft is within two nautical miles of an airspace and the current course will not take the aircraft inside, the status field shows 'Within 2 nm'.
- If the aircraft has entered an airspace, the status field shows 'Inside'.

The airspace alerts are based on three-dimensional data (latitude, longitude, and altitude) to avoid nuisance alerts. The alert boundaries for controlled airspace are also sectored to provide complete information on any nearby airspace. Once the described conditions exists, the status and time of entry is shown if the airspace alert messages are enabled on the System Setup Page (Auxiliary Page Group; see the System Overview Section).

At most three airspace alerts are displayed at any given time. The user can change the airspace alerts that are currently visible. For each airspace alert the name of the airspace, the proximity status (Inside, Ahead < 2nm, Ahead, Within 2nm), and the time until the current path of the aircraft will intercept the airspace (only when the airspace is Ahead, or Ahead < 2nm, otherwise "__:__:__" is used) is displayed. If there are more than three airspace alerts they are displayed in a scrollable list box with only three visible at one time.

AIRSPACE TYPE AND CONTROLLING AGENCY

The Airspace Agency section of the Nearest Airports Window (Figure 5-60) displays the following information for the selected airspace alert:

- ICAO control area
- Class B (FAA TCA)
- Mode C tower area
- Alert area
- Caution area
- Danger area
- Prohibited area
- Restricted area
- Training area
- Unknown area
- Warning area
- Class C, ICAO terminal control area, Terminal radar service area (TRSA), Mode C area, and Military operations area (MOA)
- Class C, ICAO control area, ICAO terminal control area, Class B (FAA TCA), Terminal radar service area, and Mode C area
- Mode C tower area
- Military operations area (MOA), Warning area, Alert area, Caution area, Danger area, Prohibited area, Restricted area, Training area, and Unknown area
- Class B airspaces
- Class C airspaces
- Class D airspaces
- MOA airspaces

NOTE: *All airspace alerts, except for prohibited areas, may be turned on or off from the System Setup Page. An altitude buffer is also provided on the System Setup Page to provide an extra margin of safety above or below the published limits. See the System Overview Section for additional details.*

The Vertical Limits Box section displays the floor and ceiling limits of the airspace alert. The following are examples of what may appear as vertical limits for an airspace:

- 5,000 ft MSL (5,000 feet mean sea level)
- 5,000 ft AGL (5,000 feet above ground level)
- MSL (at mean sea level)
- Notam (see Notice to Airmen)
- Unknown
- Unlimited
- See Chart
- Surface

Selecting and quickly tuning an associated frequency for the currently selected airspace alert:

1) Select the Nearest Airspaces Page.
2) Press the **FREQ** Softkey.
3) Select the desired frequency.
4) Press the **ENT** Key to load the frequency into the COM frequency standby field.
5) Press the **FMS** Knob to remove the flashing cursor.

OR:

1) Select the Nearest Airspaces Page.
2) Press the **MENU** Key.
3) Highlight 'Select Frequency Window'.
4) Press the **ENT** Key.
5) Select the desired frequency.
6) Press the **ENT** Key to load the frequency into the COM frequency standby field.
7) Press the **FMS** Knob to remove the flashing cursor.

GENERAL NOTES ON ASSOCIATED FREQUENCIES

For each frequency the frequency type (ATIS, Ground, Tower, ILS, etc.) and the frequency are displayed on the same list row. For a frequency which has a "frequency information page", an "i" symbol is displayed on the list row between the frequency type and the frequency. If there are more than three frequencies for an airport waypoint index then they are displayed in a scrollable list box with only three visible at a time.

5.18 NEAREST AIRPORTS (PFD)

The Nearest Airports window on the PFD displays the 25 nearest airports along with the information shown in Figure 5-47:

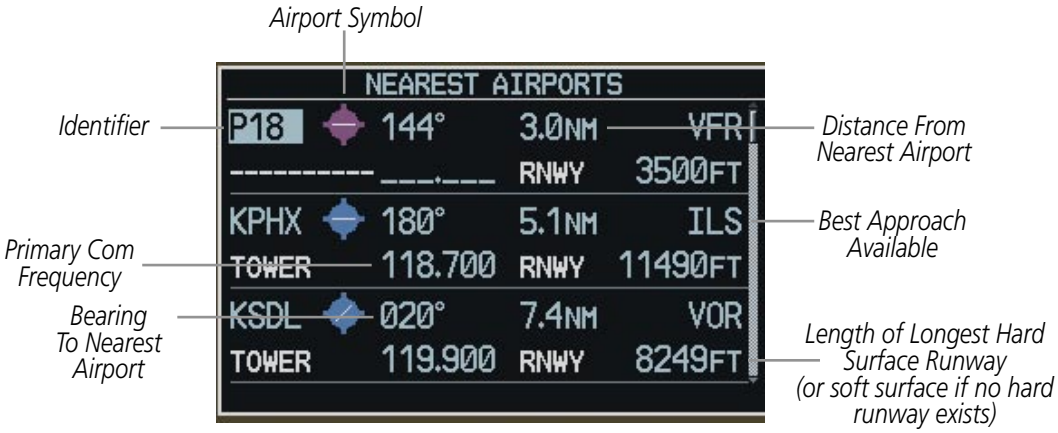


Figure 5-47 Nearest Airports Window

OPERATIONS

The Nearest Airports Window is enabled and disabled by pressing the **NRST** Softkey. From the Nearest Airports Window, information for a selected airport can be viewed, the active primary communications frequency can be selected, and direct-to navigation can be activated.

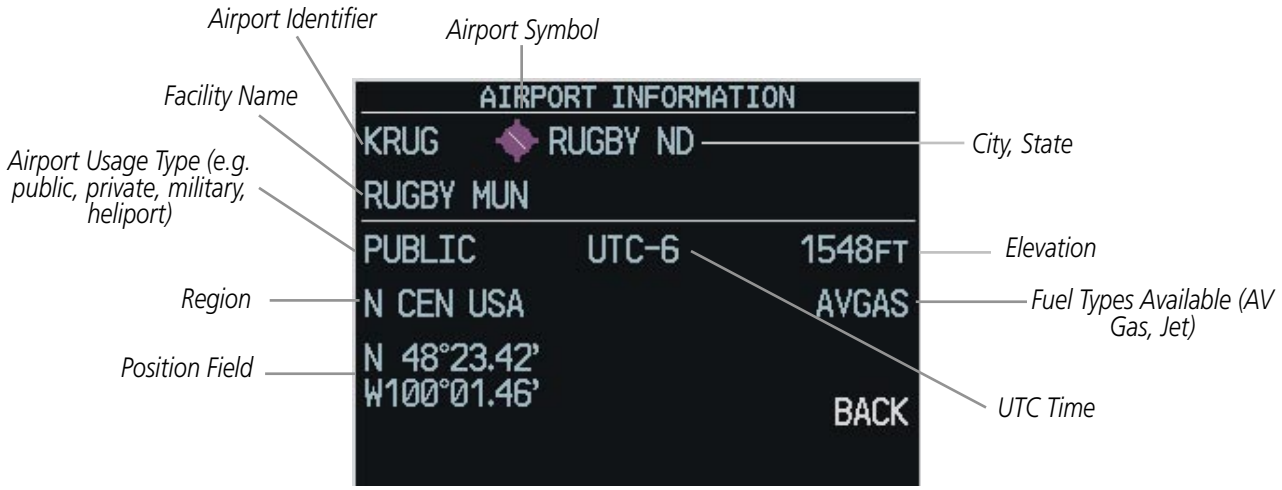


Figure 5-48 Airport Information Window

Viewing information about an airport:

1) Press the **NRST** Softkey to display a list of the nearest airports.
2) Select the desired airport.
3) Press the **ENT** Key.
4) The airport information is displayed with 'BACK' highlighted at the bottom of the window (Figure 5-49).
5) When finished viewing the airport information, press the **ENT** Key to return to the nearest airports list.

Activating a direct-to:

From the Nearest Airports Window, highlight the desired airport, then press the **Direct-to** Key. The Direct-to Window appears. Press the **ENT** Key twice to activate.

Figure 5-49 Airport Information Window

Selecting a COM frequency:

From the Nearest Airports Window, highlight the desired frequency, then press the **ENT** Key. The frequency is placed in the standby COM frequency field in the COM Tuning Box.

Figure 5-50 COM Frequency

5.19 FLIGHT PLANNING (MFD)

FLIGHT PLANNING OPERATIONS

Creating a new flight plan:

1) From the Flight Plan catalog page, press the **NEW** Softkey. The Stored Flight Plan Page is displayed with a blank field for the first empty storage location.
2) Enter the identifier, facility, or city name of the departure waypoint (Figure 5-51).
3) Press the **ENT** Key.
4) Enter the identifier for each additional flight plan waypoint.
5) Once all waypoints have been entered, press the **FMS** Knob to store the flight plan and return to the Flight Plan Catalog Window.

OR:

1) Press the **FPL** Key.
2) Turn the small **FMS** Knob to display the Flight Plan Catalog Window.
3) Press the **MENU** Key.
4) Highlight 'Create New Flight Plan'.
5) Press the **ENT** Key. The Stored Flight Plan Page is displayed. A blank flight plan page is displayed for the first empty storage location. Enter the identifier, facility, or city name of the departure waypoint and press the **ENT** Key.
6) Enter the identifier for each additional flight plan waypoint.
7) Once all waypoints have been entered, press the **FMS** Knob to store the flight plan and return to the Flight Plan Catalog Window.

Figure 5-51 Creating a Flight Plan

Viewing flight plan information:

1) Select the Flight Plan Catalog Page.
2) Highlight the desired flight plan from the list.
3) The Flight Plan Information is displayed showing departure, destination, total distance, and enroute safe altitude information for the selected Flight Plan (Figure 5-52).

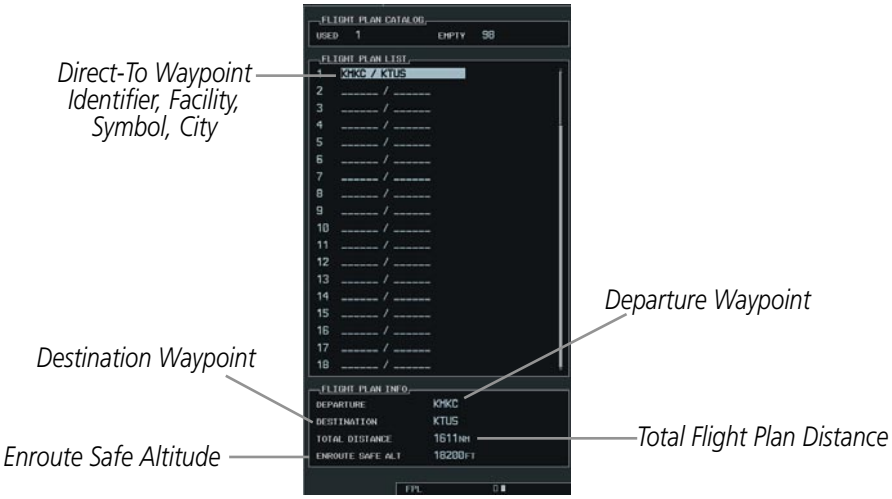


Figure 5-52 Flight Plan Information

Adding a waypoint to a stored flight plan:

1) From the Flight Plan Catalog Window, press the **FMS** Knob to activate the cursor.
2) Highlight the desired flight plan.
3) Press the **EDIT** Softkey.
4) To add a waypoint to the flight plan, select the point in the plan where the new waypoint is to be added. If an existing waypoint is highlighted, the new waypoint is placed directly in front of this waypoint.
5) Enter the identifier, facility, or city of the new waypoint.
6) Press the **ENT** Key. The new waypoint now exists in the flight plan.

OR:

1) From the Flight Plan Catalog Window, press the **FMS** Knob to activate the cursor.
2) Highlight the desired flight plan.
3) Press the **ENT** Key.
4) To add a waypoint to the flight plan, select the point in the plan where the new waypoint is to be added. If an existing waypoint is highlighted, the new waypoint is placed directly in front of this waypoint.
5) Enter the identifier, facility, or city of the new waypoint.
6) Press the **ENT** Key. The new waypoint now exists in the flight plan.

Removing individual waypoints from the flight plan, except waypoints in the final approach segment:

1) From the Active Flight Plan Window, select the waypoint that is to be deleted.
2) Press the **CLR** Key. A confirmation window is displayed listing the waypoint.
3) With 'OK' highlighted, press the **ENT** Key. To cancel the removal request, highlight 'CANCEL' and press the **ENT** Key.

Figure 5-53 Confirmation Window

Changing the flight plan title:

1) Press the **FMS** Knob from the Active Flight Plan Page.
2) Highlight the Flight Plan Title Field.
3) Turn the **FMS** Knobs to change/edit the title (Figure 54).

4) Press the **ENT** Key. Note that title only changes on the Active Flight Planning Window, not the Flight Planning Catalog Window.

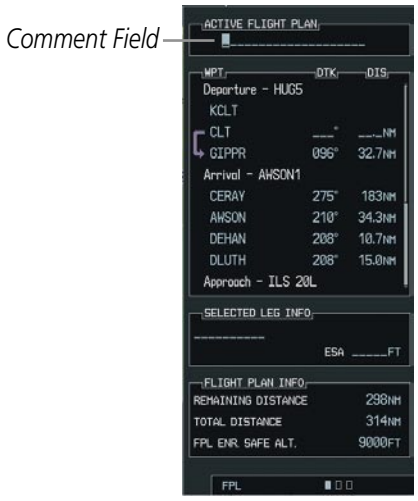


Figure 5-54 Flight Plan Title/Comment Field

'Activate Leg' selects the highlighted leg as the "active leg" (the flight plan leg which is currently used for navigation guidance).

Activating a Flight Plan Leg:

1) From the Active Flight Plan Page, highlight the desired destination waypoint.
2) Press the **ACT LEG** Softkey. An 'Activate' window is displayed (Figure 5-55).
3) With 'Activate' highlighted, press the **ENT** Key. To cancel the operation, select 'CANCEL' and press the **ENT** Key.

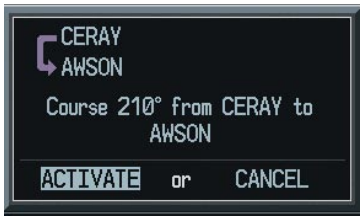


Figure 5-55 Activate Window

OR:

1) From the Active Flight Plan Page, highlight the desired destination waypoint.
2) Press the **MENU** Key.
3) Select 'Activate Leg' (Figure 5-56).
4) Press the **ENT** Key. An 'Activate' window is displayed.
5) With 'Activate' highlighted, press the **ENT** Key.

Figure 5-56 Activate Leg Menu Option

Whenever an approach, departure, or arrival is loaded into the active flight plan, a set of approach, departure or arrival waypoints is inserted into the flight plan along with a header line describing the instrument procedure the pilot selected. The original enroute portion of the flight plan remains active (unless an instrument procedure is activated) when the procedure is loaded.

Flight plans can also be stored with an approach, departure, or arrival. The active flight plan is erased when the system is turned off and overwritten when another flight plan is activated. When storing flight plans with an approach, departure or arrival, the G1000 uses the waypoint information from the current database to define the waypoints. If the database is changed or updated, the G1000 automatically updates the information if the procedure has not been modified. If an approach, departure or arrival procedure is no longer available, the procedure is deleted from the flight plan and an alert is displayed.

Storing an active flight plan from the Active Flight Plan Window:

1) Press the **MENU** Key.
2) Highlight 'Store Flight Plan'.
3) Press the **ENT** Key.
4) With 'OK' highlighted, press the **ENT** Key. The flight plan is stored in the next available position in the flight plan list on the Flight Plan Catalog Window.

Figure 5-57 Store Confirmation Window

After navigating along a flight plan, the route can be reversed for navigation guidance back to the original departure waypoint.

Inverting and activating a stored flight plan:

1) Highlight desired flight plan.
2) Press the **INVERT** Softkey from the Flight Plan Catalog Page. The 'Invert and activate stored flight plan?' Window is displayed.
3) With 'OK' highlighted, press the **ENT** Key. To cancel the operation, highlight 'CANCEL' and press the **ENT** Key.

OR:

1) Press the **FPL** Key.
2) Turn the small **FMS** Knob to display the Flight Plan Catalog Page.
3) Press the **FMS** Knob to activate the cursor.
4) Highlight the desired flight plan.
5) Press the **MENU** Key.
6) Highlight 'Invert & Activate FPL'.
7) Press the **ENT** Key. The 'Invert and activate stored flight plan?' Window is displayed.
8) With 'OK' highlighted, press the **ENT** Key. To cancel the operation, highlight 'CANCEL' and press the **ENT** Key.

'Closest Point of FPL' calculates the bearing and closest distance at which a flight plan passes from a reference waypoint. It can also be used to create a new user waypoint along the flight plan at the location closest to a chosen reference waypoint.

Determining the closest point along the active flight plan to a selected waypoint:

1) From the Active Flight Plan Window, press the **MENU**.
2) Select 'Closest Point of FPL'.
3) Press the **ENT** Key. A window is displayed with the reference waypoint field highlighted.
4) Enter the identifier of the reference waypoint.
5) Press the **ENT** Key.
6) The G1000 displays the location, lat/lon, bearing (BRG), and distance (DIST) to the closest point along the flight plan from the selected reference waypoint. To create a user waypoint at this location and add it to the flight plan, highlight 'LOAD' and press the **ENT** Key. The name for the new user waypoint is derived from the identifier of the reference waypoint.

Copying a stored flight plan into another storage slot:

1) From the Flight Plan Catalog Window, press the **FMS** Knob to activate the cursor.
2) Highlight the desired flight plan.
3) Press the **MENU** Key.
4) Highlight 'Copy Flight Plan'.
5) Press the **ENT** Key. A 'Copy to flight plan?' confirmation window is displayed.

6) With 'OK' highlighted, press the **ENT** Key to copy the flight plan. To cancel, highlight 'CANCEL' and press the **ENT** Key.

OR:

1) From the Flight Catalog Window, press the **FMS** Knob to activate the cursor.
2) Highlight the desired flight plan.
3) Press the **COPY** Key. A 'Copy to flight plan?' confirmation window is displayed.
4) With 'OK' highlighted, press the **ENT** Key to copy the flight plan. To cancel, highlight 'CANCEL' and press the **ENT** Key.

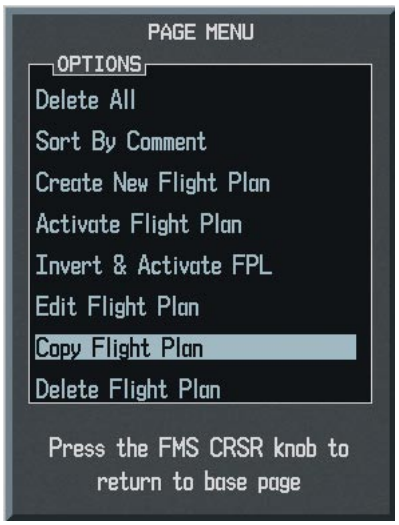


Figure 5-58 Copy a Flight Plan

The 'Sort by Comment' menu option sorts flight plans alphanumerically based upon the comment assigned to each flight plan. Procedures on how to enter a comment (flight plan name) are described in the Active Flight Plan Window section.

Sorting by comment (flight plan name):

1) From the Flight Plan Catalog Window, press the **MENU** Key.
2) Highlight 'Sort By Comment' and press the **ENT** Key. A confirmation window is displayed.
3) With OK highlighted, press the **ENT** Key to change flight plan ordering. To cancel, highlight 'CANCEL' and press the **ENT** Key.

Deleting a flight plan (stop navigating):

1) From the Flight Plan Catalog Page, press the **FMS** Knob to activate the cursor.
2) Highlight the flight plan to delete.
2) Press the **MENU** Key.
3) Highlight 'Delete Flight Plan'.
4) Press the **ENT** Key. A 'Delete flight plan?' confirmation window is displayed.
5) With 'OK' highlighted, press the **ENT** Key to delete the flight plan. To cancel, highlight 'CANCEL' and press the **ENT** Key:

OR:

1) Highlight the desired destination waypoint.
2) Press the **DELET**E Softkey from the Flight Plan Catalog Page. A confirmation window is displayed.
3) With 'Activate' highlighted, press the **ENT** Key. To cancel the operation, select 'CANCEL' and press the **ENT** Key.

OR:

1) From the Active Flight Plan Page, press the **MENU** Key.
3) Highlight 'Delete Flight Plan'.
4) Press the **ENT** Key. A 'Delete flight plan?' confirmation window is displayed.
5) With 'OK' highlighted, press the **ENT** Key to delete the flight plan. To cancel, highlight 'CANCEL' and press the **ENT** Key:

Deleting all stored flight plans:

1) From the Flight Plan Catalog Window, press the **MENU** Key.
2) Highlight 'Delete All' and press the **ENT** Key. A 'Delete all flight plans?' confirmation window is displayed.
3) With 'OK' highlighted, press the **ENT** Key to delete all flight plans. To cancel, highlight 'CANCEL' and press the **ENT** Key.

Creating user waypoints using the Active Flight Plan Window Map:

1) With the Active Flight Plan Window displayed, push the **JOYSTICK** to activate the panning function. The target pointer is displayed at the present aircraft position.

2) After placing the pointer at the desired position, press the **ENT** Key. The User Waypoint Information Window is displayed with the captured position. At this point, the User Waypoint is added to the flight plan list. If a waypoint in the list is highlighted, the new user waypoint is placed before that waypoint, if there is no highlight, the new user waypoint is placed at the end of the list.

3) Enter a waypoint name.

4) Press the **ENT** Key to accept the selected name. The first reference waypoint field is highlighted.

5) If desired, enter the identifier of the reference waypoint and the radial and distance to the reference waypoint.

6) Press the **ENT** Key to accept.

7) Press the **FMS** Knob to remove the flashing cursor.

VERTICAL NAVIGATION

NOTE: *An active flight plan or direct-to must be entered in order to utilize the VNAV feature.*

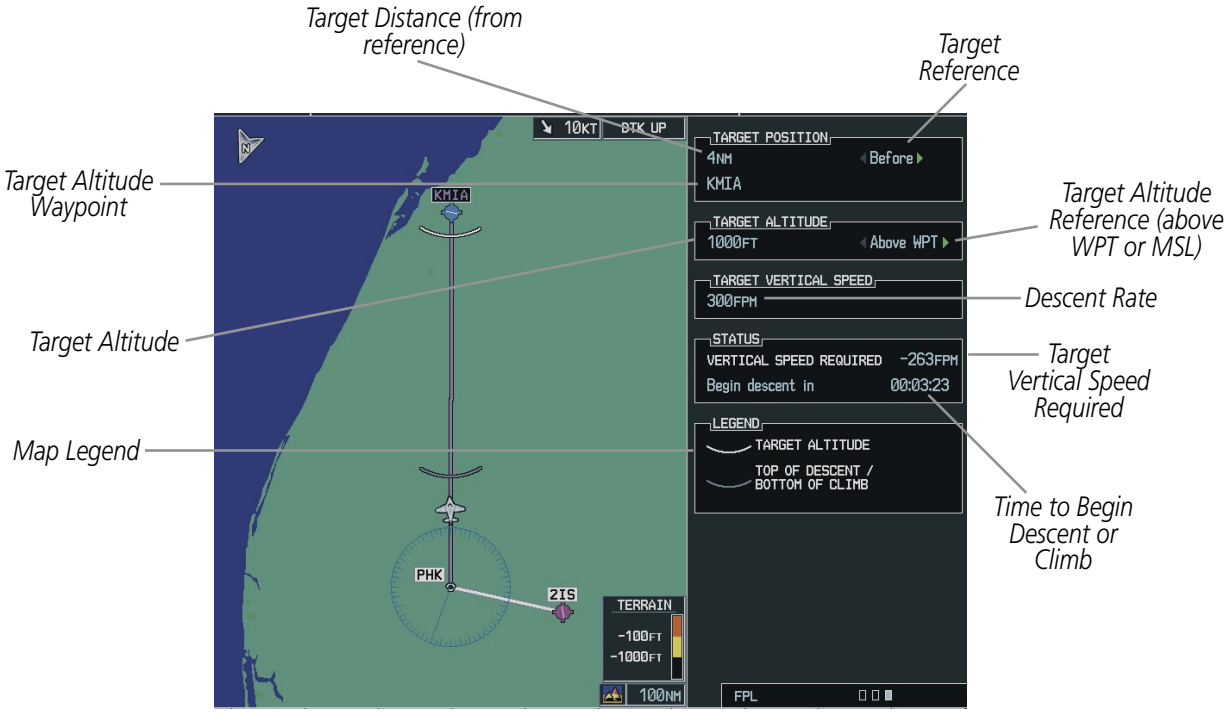


Figure 5-59 Vertical Navigation Page

The Vertical Navigation feature allows the creation of a three-dimensional profile which gives guidance from the present position and altitude to a final (target) altitude at a specified location. This is helpful when the pilot wants to descend to a certain altitude near an airport or climb to an altitude before reaching a route or direct-to waypoint. Once the profile is defined, message alerts and additional data on the PFD informs the pilot of progress. The Vertical Navigation Page displays the information shown in Figure 5-59.

NOTE: *The Vertical Navigation Page Map orientation is always 'Desired Track Up'.*

Creating a vertical navigation profile:

1) Press the **FPL** Key.
2) Select the Vertical Navigation Page (third page icon).
3) Press the **FMS** Knob to activate the cursor.
4) With the 'TARGET POSITION' distance field highlighted, select the desired distance for Top Of Climb or Bottom Of Descent from the VNAV profile endpoint. The default distance is 4 nm.
5) Press the **ENT** Key. The cursor is now positioned over the 'Before' and 'After' field.
6) Select whether the previously set distance is 'Before' or 'After' the endpoint.
7) Press the **ENT** Key. The cursor is now placed over the VNAV profile endpoint field.

8) Turn the small **FMS** Knob to display a list possible VNAV profile endpoints. When using a flight plan, the target reference waypoint itself can be specified from the waypoints contained in the flight plan. By default, the last waypoint in the flight plan is selected. Highlight the desired waypoint.

9) Press the **ENT** Key.

10) With the 'TARGET ALTITUDE' field highlighted, select the target altitude. If the selected altitude is above the current aircraft altitude, a profiled climb is created. If the selected altitude is below the current aircraft altitude, a profiled descent will be created.

11) Press the **ENT** Key. The cursor is now placed in the 'TARGET VERTICAL SPEED' field. The default profile utilizes a 400 foot-per-minute descent rate.

12) To change the vertical speed, enter the desired vertical speed.

13) Press the **ENT** Key when finished.

With the profile set, the vertical speed required (VSR) and 'Begin Climb In' or 'Begin Descent In' time is displayed. Expect the following to occur when using the vertical navigation feature:

At one minute prior to reaching the Bottom Of Climb or Top Of Descent point (gray arc), the message 'APPR VPROF - Approaching VNAV Profile' is displayed as a PFD alert (Figure 5-60). The descent (or climb) angle also locks to prevent changes in speed from altering the profile. If selected, the vertical speed required (VSR) readout on the default NAV and map pages shows the desired vertical speed to maintain the proper descent (or climb) angle. At 500 feet above (or below, for a climb) the target altitude (white arc), an 'APPR TRG ALT' - Approaching Target Altitude (Figure 5-82) message is provided. The VSR readout on the Navigation Map Page is blanked out at this point.

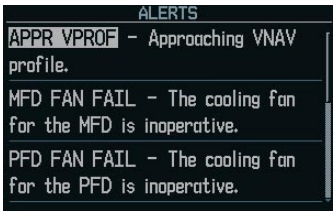

ALERTS
APPR VPROF - Approaching VNAV profile.
MFD FAN FAIL - The cooling fan for the MFD is inoperative.
PFD FAN FAIL - The cooling fan for the PFD is inoperative.

Figure 5-60 Approaching VNAV Profile Message (PFD)

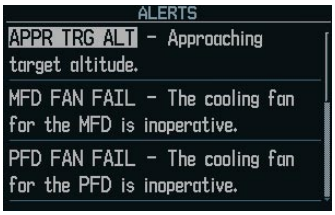

ALERTS
APPR TRG ALT - Approaching target altitude.
MFD FAN FAIL - The cooling fan for the MFD is inoperative.
PFD FAN FAIL - The cooling fan for the PFD is inoperative.

Figure 5-61 Approaching Target Altitude Message (PFD)

NOTE: *The VNAV mesages (Figures 5-60 and 5-61) will only be displayed if the VNAV messages are enabled. Press the MENU key on the VNAV Page to enable or disable the messages.*

The VNAV messages are not enabled until the 'VNAV Messages On?' option is enabled from the VNAV Page **MENU** (Figure 5-62). To display the page **MENU**, press the **MENU** Key (with the VNAV Page displayed). The VNAV Page Options **MENU** also allows the pilot to restore VNAV page defaults.

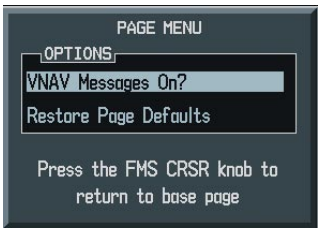


Figure 5-62 Vertical Navigation Page Menu

To view the vertical speed required on any MFD Page, a field in the Navigation Status Bar must be configured to display VSR (Figure 5-63, see the System Setup Page Instructions for details).

Figure 5-63 Vertical Navigation Page Menu

5.20 FLIGHT PLANNING (PFD)

Flight planning on the PFD centers around the Flight Plan Window (Figure 5-64) where flight plans can be created, edited, and activated. The Flight Plan Window is enabled and disabled by pressing the **FPL** Key.

Figure 5-64 Flight Plan Window

OPERATIONS

The following operations can be performed using the Flight Plan Window Menu (Figure 5-65).

- Activate leg
- Store, invert, or delete flight plan
- Load or remove departure, arrival, or approach
- Closest Point of FPL
- Restore defaults
- Parallel track

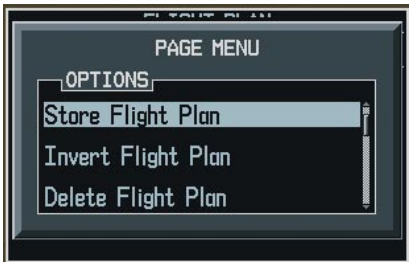


Figure 5-65 Flight Plan Page Menu

CREATE NEW FLIGHT PLAN

Up to 99 flight plans with up to 31 waypoints in each flight plan can be created and stored in memory.

Creating a new flight plan:

1) Press the **FPL** Key.
2) Press the **FMS** Knob to activate the cursor. The waypoint field is highlighted.
3) Enter the identifier, city/state, or facility name of the airport/waypoint.
4) Press the **ENT** Key. The cursor flashes on the next empty waypoint field.
5) Enter the identifier for each additional waypoint.
6) Press the **FPL** Key to remove the window.

ACTIVATE LEG

'Activate Leg' selects the highlighted leg as the "active leg" (the flight plan leg which is currently used for navigation guidance).

Activating a flight plan along a specific leg:

1) From the Flight Plan Window, press the **FMS** Knob to activate the cursor.
2) Highlight the desired destination waypoint.
3) Press the **MENU** Key.
4) Highlight 'Activate Leg'.
5) Press the **ENT** Key. A confirmation window is displayed with 'ACTIVATE' highlighted.
6) Press the **ENT** Key.

STORE FLIGHT PLAN

The active flight plan is erased when the G1000 is powered off or when another flight plan is activated. When storing flight plans with an approach, departure or arrival, the G1000 uses the waypoint information from the current database to define the waypoints in the flight plan. If the navigation database is changed or updated, the G1000 automatically updates the information if the procedure has not been modified. If an approach, departure or arrival procedure is no longer available, the flight plan becomes "locked" until the procedure is deleted from the flight plan or until the correct navigation database is installed.

Storing a flight plan:

1) From the Flight Plan Window (once all of the waypoints have been entered), press the **MENU** Key to display the page menu.
2) Select 'Store Flight Plan'.
3) Press the **ENT** Key. The Store Flight Plan Window is displayed with 'OK' highlighted.
4) Press the **ENT** Key to store the flight plan in the next available memory slot.
5) Press the **ENT** Key.

INVERT FLIGHT PLAN

'Invert Flight Plan' reverses the active flight plan. After traveling along a flight plan, the pilot may wish to reverse the route for navigation back to the original departure point.

Activating an existing flight plan in reverse:

1) From the Flight Plan window, press the **MENU** Key.
2) Highlight 'Invert Flight Plan'.
3) Press the **ENT** Key. A confirmation window is displayed.
4) Select 'OK'.
5) Press the **ENT** Key. The flight plan is now reversed and activated.

DELETE FLIGHT PLAN

The entire flight plan or selected waypoints within the flight plan may be deleted.

Deleting the entire flight plan:

1) From the Flight Plan Window, press the **MENU** Key.
2) Highlight 'Delete Flight Plan'.
3) Press the **ENT** Key.
4) Press the **ENT** Key to delete all waypoints in the flight plan.

Deleting selected waypoints in the flight plan:

1) From the Flight Plan Window, select the desired waypoint.
2) Press the **CLR** Key. The 'Remove Waypoint Name?' Window is displayed with 'OK' highlighted.
3) Press the **ENT** Key.

CLOSEST POINT OF FPL

'Closest Point of FPL' calculates the bearing and closest distance at which a flight plan passes a reference waypoint. It may also be used to create a new user waypoint along the flight plan at the location closest to a chosen reference waypoint.

Determining the closest point along the active flight plan to a selected waypoint:

1) From the Flight Plan Window, press the **MENU** Key.
2) Highlight 'Closest Point of FPL'.
3) Press the **ENT** Key. A window appears with the reference waypoint field highlighted.
4) Enter the identifier of the reference waypoint.
5) Press the **ENT** Key. The G1000 displays the bearing (BRG) and distance (DIS) to the closest point along the flight plan from the selected reference waypoint.
6) To create a user waypoint at this location and add it to the flight plan, press the **ENT** Key. The name for the new user waypoint is derived from the identifier or the reference waypoint.

5.21 PROCEDURES (MFD)

DEPARTURES, ARRIVALS, AND APPROACHES

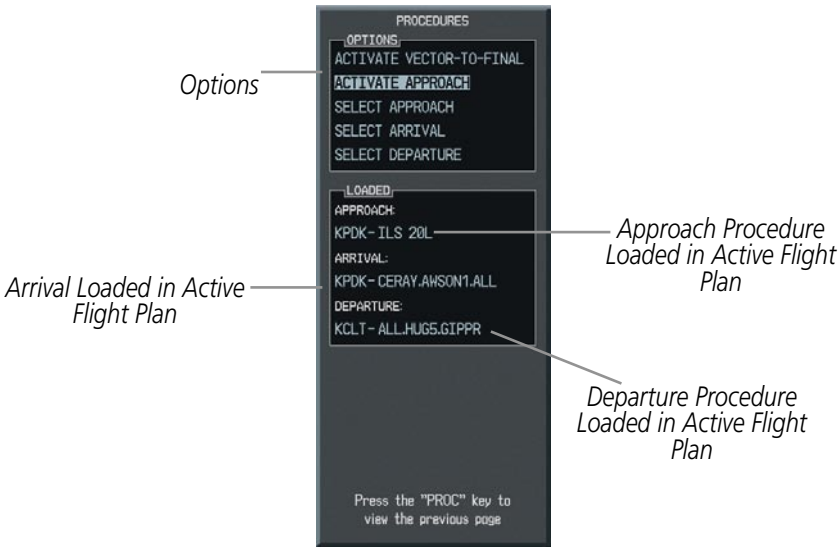


Figure 5-66 Procedures Window

DEPARTURE OPERATIONS

Loading and activating a departure procedure:

1) Press the **PROC** Key. The Procedures Window is displayed (Figure 5-66).

2) Highlight 'SELECT DEPARTURE'.

3) Press the **ENT** Key. The DEPARTURE window is displayed on the 'PROC – DEPARTURE LOADING Page.

4) Select a departure.

5) Press the **ENT** Key. The RUNWAY window may be displayed.

6) Select a runway.

7) Press the **ENT** Key. The TRANSITION window may be displayed.

8) Select a transition.

9) Press the **ENT** Key.

10) With 'LOAD' highlighted, press the **ENT** Key. The departure procedure is displayed as part of the overall flight plan and is placed in front of the enroute flight plan.

OR:

1) With the Departure Loading Page displayed (Figure 5-67), press the **FMS** Knob to activate the cursor.

2) Enter an identifier, facility name or city location field.

3) Press the **ENT** Key until the DEPARTURE window is displayed.

4) Select a departure.

5) Press the **ENT** Key. The RUNWAY window may be displayed.

6) Select a runway.

7) Press the **ENT** Key. The TRANSITION window may be displayed.

8) Select a transition.

9) Press the **ENT** Key. The departure is now ready to load.

10) Press the **FMS** Knob to remove the cursor.

Figure 5-67 Departure Loading Page

Activating a departure leg:

1) Press the **FPL** key.

2) Press the **FMS** Knob to activate the cursor.

3) Turn the large **FMS** Knob to highlight the desired waypoint within the departure.

4) Press the **ACT LEG** softkey. A confirmation window showing the selected leg will be displayed.

5) With 'ACTIVATE' highlighted, press the **ENT** key.

Viewing a Departure Airport:

1) Select the Departure Information Page.

2) Press the **MENU** Key.

3) Highlight 'View Departure Airport'.

4) Press the **ENT** Key. The Departure Airport Page is displayed.

OR:

1) Select the Approach Information Page.

2) Press the **MENU** Key.

3) Highlight 'View Departure Airport'.

4) Press the **ENT** Key. The Departure Information Page is displayed.

OR:

1) Select the Arrival Information Page.

2) Press the **MENU** Key.

3) Highlight 'View Departure Airport'.

4) Press the **ENT** Key. The Departure Information Page is displayed.

5) Enter an identifier, facility, or city name for the departure airport.

Removing a departure:

1) From the Active Flight Plan Window, press the **MENU** Key.

2) Select the 'Remove Departure' option.

3) Press the **ENT** Key. A confirmation window is displayed listing the procedure.

4) With 'OK' highlighted, press the **ENT** Key. To cancel the removal request, highlight 'CANCEL' and press the **ENT** Key.

ARRIVAL OPERATIONS

Loading an arrival procedure:

1) Select the 'WPT' page group.

2) Select the first rectangular page icon.

3) Press the **STAR** Softkey..

Figure 5-68 Arrival Loading Page

4) Select an arrival.

5) Press the **ENT** Key. The TRANSITION window is displayed.

6) Select a transition.

7) Press the **ENT** Key. The RUNWAY window may be displayed. If so, select a runway.

8) Press the **ENT** Key.

9) With 'LOAD' highlighted, press the **ENT** Key. The arrival procedure is displayed as part of the overall flight plan and is placed at the end of the enroute flight plan.

OR:

1) Press the **PROC** Softkey.
2) Highlight 'SELECT ARRIVAL'.
3) Press the **ENT** Key. The ARRIVAL window is displayed on the 'PROC – ARRIVAL LOADING' Page.
4) Select an arrival.
5) Press the **ENT** Key. The TRANSITION window is displayed.
6) Select a transition.
7) Press the **ENT** Key. The RUNWAY window may be displayed. If so, select a runway.
8) Press the **ENT** Key.
9) With 'LOAD' highlighted, press the **ENT** Key. The arrival procedure is displayed as part of the overall flight plan and is placed at the end of the enroute flight plan.

OR:

1) Select the Arrival Information Page.
2) Press the **MENU** Key.
3) Highlight 'Load Arrival'.
4) Press the **ENT** Key. The Active Flight Plan Page is displayed. The arrival procedure is displayed as part of the overall flight plan and is placed after the enroute flight plan.

Removing an arrival:

1) From the Active Flight Plan Window, press the **MENU** Key.
2) Select the 'Remove Approach', 'Remove Arrival' or 'Remove Departure' option.
3) Press the **ENT** Key. A confirmation window is displayed listing the procedure.
4) With 'OK' highlighted, press the **ENT** Key. To cancel the removal request, highlight 'CANCEL' and press the **ENT** Key.

APPROACH OPERATIONS

Since not all approaches in the database are approved for GPS use. When selecting an approach, a "GPS" designation to the right of the procedure name indicates the procedure can be flown using the GPS receiver. Some procedures will not have this designation, meaning the GPS receiver can be used for supplemental navigation guidance only. If the GPS receiver cannot be used for primary guidance, the appropriate navigation receiver must be used for the selected approach (e.g., VOR or ILS). The final course segment of ILS approaches, for example, must be flown by tuning the NAV receiver to the proper frequency and selecting that NAV receiver on the CDI.

Figure 5-69 Selecting an Approach

Load and/or activate an approach procedure:

1) Press the **PROC** Key.
2) Highlight 'SELECT APPROACH'.
3) Press the **ENT** Key. A list of available approaches for the destination airport is displayed (Figure 5-69).
4) Turn either **FMS** Knob to highlight the desired approach.
5) Press the **ENT** Key. A list of available transitions for the selected approach procedure is now displayed.
6) Turn either **FMS** Knob to selected the desired transition. The "Vectors" option assumes vectors will be received to the final course segment of the approach and will provide navigation guidance relative to the final approach course.
7) Press the **ENT** Key. 'LOAD? or ACTIVATE?' is now displayed with 'LOAD?' highlighted. Selecting 'LOAD?' will enter the selected approach procedure into the active flight plan, but will not be currently active. Selecting 'ACTIVATE?' will enter the selected approach procedure into the active flight plan and make it immediately active.
8) Turn the large **FMS** Knob to select either 'LOAD?' or 'ACTIVATE?'.
9) Press the **ENT** Key.

Figure 5-70 Not Approved for GPS Message

OR:

1) Select the Nearest Airports Page.

2) Select the desired nearest airport.

3) Press the **APR** Softkey located at the bottom of the display. The 'LD APR' (load approach) Softkey becomes available.

4) Select the desired approach.

5) Press the **LD APR** Softkey. The Approach Loading Page is displayed with the transitions field highlighted.

6) Select the desired transition.

7) Press the **ENT** Key. The 'LOAD?' field is highlighted.

8) Press the **ENT** Key to load the approach. If navigating a flight plan previous to loading this approach, the G1000 will continue navigating the flight plan until the approach is activated.

9) Highlight the 'ACTIVATE' field.

10) Press the **ENT** Key to activate the approach and begin navigating to the IAP.

11) If the approach is not approved for GPS, a 'NOT APPROVED FOR GPS' message is displayed with 'YES' highlighted. Press the **ENT** Key to acknowledge the message (or select 'NO').

12) Press the **ENT** Key to return to the Approach Loading Page.

OR:

1) From any page, press the **PROC** Key. The Procedures Options Menu is displayed.

2) Highlight 'SELECT APPROACH'.

3) Press the **ENT** Key. The APPROACH window is displayed on the 'PROC – APPROACH LOADING' Page.

4) Select an approach.

5) Press the **ENT** Key. The TRANSITION window is displayed.

6) Select a transition (the 'VECTORS' option assumes vectors will be received to the final course segment of the approach and will provide navigation guidance relative to the final approach course.)

7) Press the **ENT** Key.

8) Highlight 'LOAD?' or 'ACTIVATE?'. 'LOAD' adds the approach to the flight plan without immediately using the approach for navigation guidance. This allows for the original flight plan to continue navigating until cleared

for the approach, but keeps the approach available for quick activation when needed. 'ACTIVATE' adds the approach to the flight plan and begins navigating the approach course.

9) If the approach is not approved for GPS, a 'NOT APPROVED FOR GPS' message is displayed with 'YES' highlighted. Press the **ENT** Key to acknowledge the message. To cancel the approach, select 'NO' and press the **ENT** Key.

Removing an approach from a direct-to or active flight plan:

1) From the Flight Plan Window, press the **MENU** Key.

2) Highlight 'Remove Departure', 'Remove Arrival', or 'Remove Approach'

3) Press the **ENT** Key. A confirmation window appears listing the procedure that is about to be removed with 'OK' highlighted.

4) Press the **ENT** Key.

Another Procedures Window option allows the pilot to select vectors to the final approach course.

Activating a (previously loaded) approach, with vectors to final:

1) Press the **PROC** Key to display the Procedures Window.

2) Highlight 'ACTIVATE VECTOR-TO-FINAL' and press the **ENT** Key.

In many cases, it may be easiest to "Load" the full approach while still some distance away, enroute to the destination airport. Later, if vectored to final, use the steps above to select 'Activate Vector-To-Final' — which makes the inbound course to the FAF waypoint active. Otherwise, activate the full approach using the 'ACTIVATE APPROACH' option.

Activating a missed approach in the active flight plan:

1) Press the **PROC** Key.

2) Highlight 'ACTIVATE MISSED APPROACH'.

3) Press the **ENT** Key. A confirmation window will be displayed.

4) With 'ACTIVATE' highlighted, press the **ENT** Key.

5.22 PROCEDURES (PFD)

The Procedures Window (Figure 5-71) provides direct access to departures, arrivals and approaches — based upon the active flight plan or direct-to destination. In either case, the departure and destination airports must have published procedures associated with them. The Procedures Window is displayed and removed by pressing the **PROC** Key .

OPERATIONS

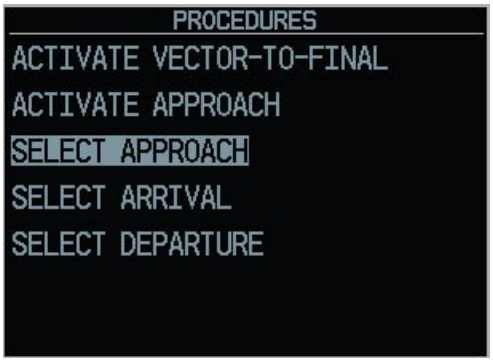


Figure 5-71 PFD Procedures Window

The following operations can be performed from the Procedures Window:

- Activate Vector-To-Final or approach
- Select approach, arrival, or departure
- Select missed approach

SELECT DEPARTURE

'Select Departure' selects a published standard instrument departure (SID) for the departure airport or replaces the current departure with a new selection. When using a direct-to, the G1000 uses the nearest airport as a reference when displaying available departures.

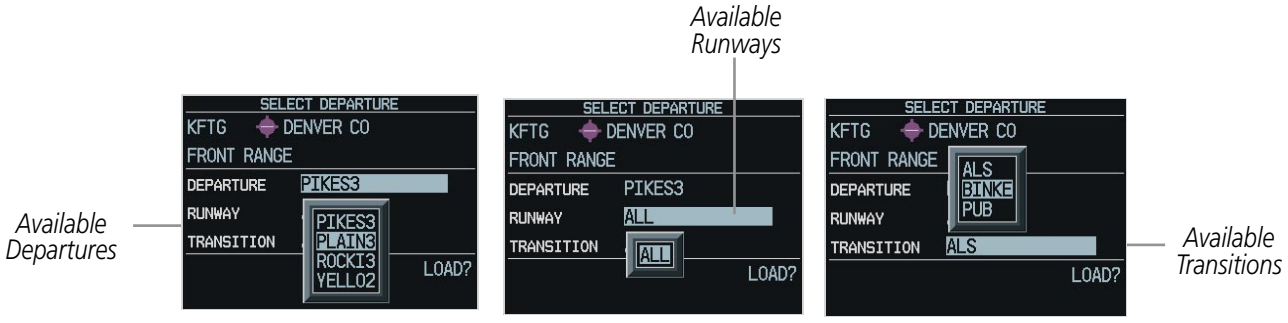


Figure 5-72 Selecting a Departure

Selecting a departure for the departure airport:

1) Display the Procedures Window by pressing the **PROC** Key.
2) Highlight 'SELECT DEPARTURE'.
3) Press the **ENT** Key.
4) Enter an identifier, city, or facility name.
5) Press the **ENT** Key until the departure field is highlighted.
6) Select the desired departure.
7) Press the **ENT** Key. A window appears listing the available transitions for the departure.
8) Select the desired transition or vectors.
9) Press the **ENT** Key. A window appears listing the available runways for the departure.
10) Select the desired runway.
11) With 'LOAD?' highlighted, press the **ENT** Key to load the departure.

SELECT ARRIVAL

'SELECT ARRIVAL' selects a published standard terminal arrival route (STAR) for the destination airport or replaces a current arrival with a new selection.

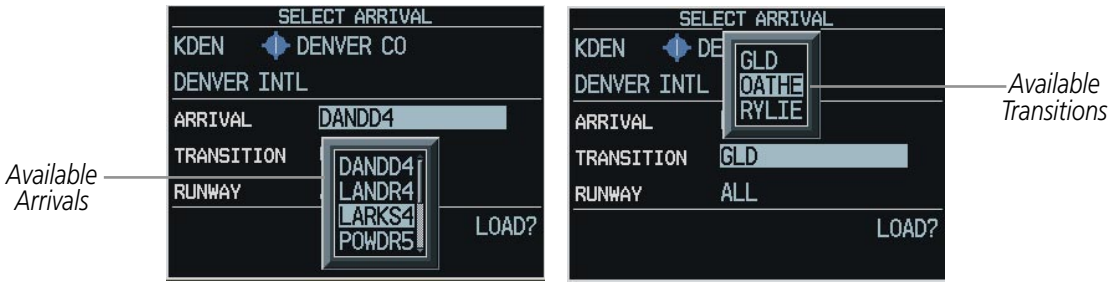


Figure 5-73 Selecting an Arrival

Selecting an arrival for a direct-to or flight plan destination airport:

1) Display the Procedures Window by pressing the **PROC** Key.

2) Highlight 'SELECT ARRIVAL'.

3) Press the **ENT** Key.

4) Enter an identifier, city, or facility name.

5) Press the **ENT** Key until the arrival field is highlighted.

6) Select the desired arrival.

7) Press the **ENT** Key. A window appears listing the available transitions for the arrival.

8) Select the desired transition or vectors.

9) Press the **ENT** Key. A window appears listing the available runways for the arrival.

10) Select the desired runway.

11) With 'LOAD?' highlighted, press the **ENT** Key to load the arrival.

SELECT APPROACH

'SELECT APPROACH' selects a published instrument approach for the destination airport or replaces the current approach with a new selection.

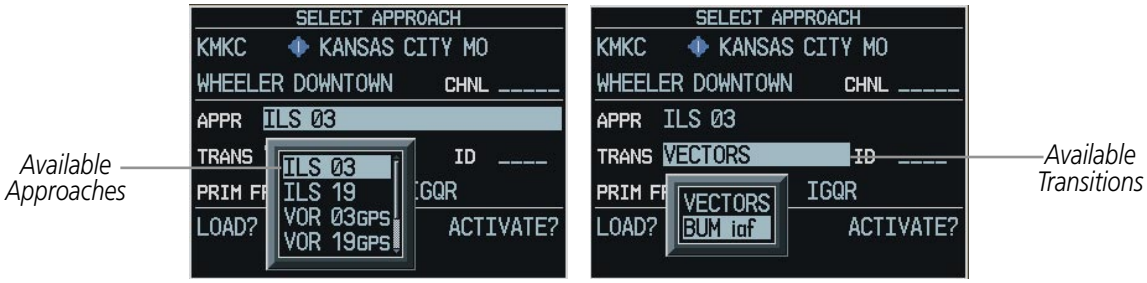


Figure 5-74 Selecting an Approach

Selecting an approach for a direct-to or flight plan destination airport:

1) Display the Procedures Window by pressing the **PROC** Key.

2) Highlight 'SELECT APPROACH'.

3) Press the **ENT** Key.

4) Enter an identifier, city, or facility name.

5) Press the **ENT** Key until the approach field is highlighted.

6) Select the desired approach.

7) Press the **ENT** Key. A window appears listing the available transitions for the approach.

8) Select the desired transition or vectors.

9) Press the **ENT** Key.

10) With 'LOAD?' highlighted, press the **ENT** Key to load the approach OR: to activate the approach, highlight 'ACTIVATE?'. NOTE: If the approach is not approved for GPS, a 'NOT APPROVED FOR GPS' message is displayed with 'YES' highlighted. Press the **ENT** Key to acknowledge the message. To cancel the approach, select 'NO' and press the **ENT** Key.

ACTIVATE APPROACH

'ACTIVATE APPROACH' activates the approach.

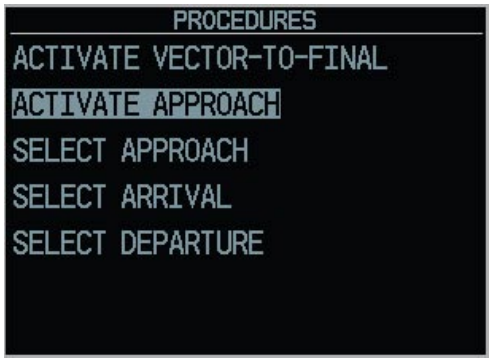


Figure 5-75 Activate Approach Selection

Activating the approach for a direct-to or flight plan destination airport:

1) From the active flight plan window, press the **PROC** Key to display the Procedures Window.
2) Highlight 'ACTIVATE APPROACH'.
3) Press the **ENT** Key.

ACTIVATE VECTOR-TO-FINAL

'ACTIVATE VECTOR-TO-FINAL' allows the pilot to select vectors to the final approach course.

.

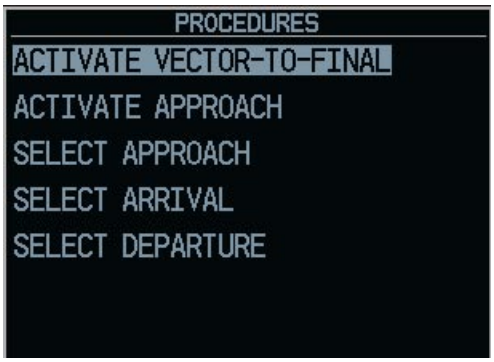


Figure 5-76 Activate Vector-To-Final Selection

Activating the approach with vectors to final:

1) From an active flight plan, press the **PROC** Key to display the Procedures Options Window.
2) Highlight 'ACTIVATE VECTOR-TO-FINAL'.
3) Press the **ENT** Key.

Blank Page

SECTION 6 HAZARD AVOIDANCE

The hazard avoidance features available for the G1000 system are designed to aid situational awareness and provide advisory information with regard to potential hazards to flight safety associated with weather, terrain, and air traffic.

Hazard avoidance in the G1000 is divided into the following categories:

Weather

- GDL 69/69A XM® WX Satellite Weather
- L-3 STORMSCOPE® WX-500 Series II Weather Mapping Sensor

Terrain Avoidance

- Terrain Proximity (non-TSO-C151b-certified)
- TAWS (Terrain Awareness and Warning System - TSO C151b-certified)

Traffic

- TIS (Traffic Information Service)
- L-3 SKYWATCH® Traffic Advisory System

6.1 XM WX SATELLITE WEATHER

NOTE: *XM WX Satellite Weather data provides information for avoiding hazardous weather. Never use it to penetrate hazardous weather.*

The GDL 69/69A is a remote-mounted data-link satellite receiver that is capable of receiving XM WX Satellite Weather data and displaying received graphical weather information and associated text on the G1000 Multi Function Display (MFD) and the Primary Flight Display (PFD) Inset Map. The GDL 69A can receive XM Satellite Radio® entertainment services. Both weather data and entertainment programming operate in the S-band frequency range to provide continuous reception capabilities at any altitude throughout North America.

XM Satellite Radio services are subscription-based. For more information on specific service packages, visit www.xmradio.com.

ACTIVATING XM WEATHER AND RADIO SERVICES

Before XM WX Satellite Weather can be used, the service must be activated. The service is activated by providing XM Satellite Radio with either one or two coded IDs, depending on the equipment.

For the GDL 69, the Data Radio ID must be provided to XM Satellite Radio services to activate the weather service subscription. For the GDL 69A, either the Audio Radio ID or the Data Radio ID - or both - must be provided to XM Satellite Radio to activate the weather service and/or entertainment subscriptions.

It is not required to activate both the entertainment and weather service subscriptions with the GDL 69A. Either or both services can be activated. XM Satellite Radio uses one or both of the coded IDs to send an

activation signal that, when received by the GDL 69/69A, allows it to display weather data and/or entertainment programming.

These IDs are located:

- On the label on the back of the Data Link Receiver
- On the XM Information Page on the MFD (Figure 6-1)
- On the XM Satellite Radio Activation Instructions included with the unit

Contact the installer if the Data Radio ID and the Audio Radio ID cannot be located.

Activating the XM WX Satellite Weather and XM Satellite Radio Services:

1) Contact XM WX Satellite Radio through the email address listed on their website (www.xmradio.com) or by the customer service phone number listed on the website. Follow the instructions provided by XM Satellite Radio services.

2) Select the Auxiliary Page Group.

3) Select the fifth rectangular page icon.

4) Press the **INFO** Softkey to display the XM Information Page.

5) Verify that the desired services are activated.

6) Press the **DONE** Softkey.

7) Turn the large **FMS** Knob to highlight 'YES'.

8) To complete activation, press the **ENT** Key.

XM Satellite Radio activation instructions are also available at www.garmin.com (P/N 190-00355-04).

Figure 6-1 XM Information Page

USING XM WX SATELLITE WEATHER PRODUCTS

The Weather Data Link Page is in the Map group of pages. It is the primary starting point for viewing weather data because it can display all available XM weather products. No other G1000 page can display all XM weather products.

When a weather product is active on the Weather Data Link Page or the Navigation Map Page, the age of the data displays on the screen. This represents the age of the product, based on the difference between when the data was assembled on the ground and the current GPS time (Figure 6-2).

Weather products are refreshed at specific intervals as defined in the **Refresh Rate** column in Table 6-1. The refresh rate represents the interval at which XM Satellite Radio broadcasts new signals that may or may not contain new weather data. It does not represent the rate at which weather data is updated or new content is received by the Data Link Receiver. Weather data and new content are updated at intervals that are defined and controlled by XM Satellite Radio and its data vendors.

If, for any reason, a weather product is not refreshed within 30-, 60-, or 90-minute intervals as defined in the **Expiration Time** column in Table 6-1, the data is considered expired and is removed from the display. This ensures that the displayed data is consistent with what is currently being broadcast by XM Satellite Radio services. If more than half of the expiration time has elapsed, the color and time displayed in the upper right corner of the Weather Data Link Page changes from light blue to yellow.

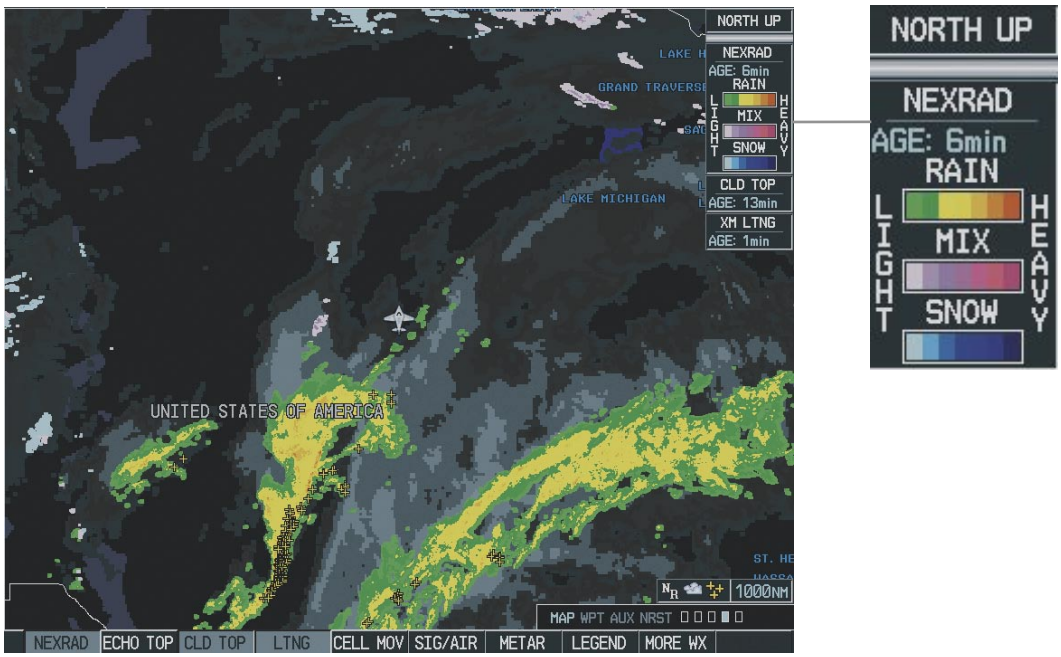


Figure 6-2 Weather Data Link Page

Table 6-1 shows the weather product symbols and the product lifetimes.

Weather Product	Symbol	Expiration Time (Minutes)	Refresh Rate (Minutes)
NEXRAD		30	5
Cloud Top (CLD TOP)		60	15
Echo Top		30	7.5
XM Lightning (LTNG)		30	5
Cell Movement (SCIT)		30	12
SIGMETs/AIRMETs (SIG/AIR)		60	12
METARs		90	12
City Forecast (CITY)		60	12
Surface Analysis (SFC)		60	12
Freezing Levels (FRZ LVL)		60	12
Winds Aloft (WIND)		60	12
County Warnings (COUNTY)		60	5
Cyclone Warnings (CYCLONE)		60	12
Radar Coverage	no product image	30	5
TFRs	no product image	60	12
TAFs	no product image	60	12

Table 6-1 Weather Product Lifetimes

NOTE: *The refresh rate represents the interval at which XM Satellite Radio broadcasts new signals that may or may not contain new weather data. It does not represent the rate at which weather data is updated or new content is received by the Data Link Receiver. Weather data is updated at intervals that are defined and controlled by XM Satellite Radio and its data vendors.*

Table 6-2 shows which XM WX Satellite Weather products display on specific pages of the MFD and the PFD Inset Map. The positive symbols represent the presence of this data on the page.

Weather Product	PFD Inset Map	Navigation Map Page	Weather Data Link Page	Weather Information Page	AUX - Trip Planning Page	Nearest Page Group	Flight Plan Pages (except VNAV)
NEXRAD	+	+	+		+	+	+
Cloud Top (CLD TOP)			+				
Echo Top			+				
XM Lightning (LTNG)	+	+	+		+	+	+
Cell Movement (SCIT)	+	+	+		+	+	+
SIGMETs/AIRMETs (SIG/AIR)			+				
METARs			+	+			
City Forecast (CITY)			+				
Surface Analysis (SFC)			+				
Freezing Levels (FRZ LVL)			+				
Winds Aloft (WIND)			+				
County Warnings (COUNTY)			+				
Cyclone Warnings (CYCLONE)			+				
Radar Coverage		+	+				
TFRs	+	+	+	+	+	+	+
TAFs			+	+			

Table 6-2 Weather Product Display Maps

WEATHER SOFTKEYS ON THE WEATHER DATA LINK PAGE

Weather softkeys (Figure 6-3) display at the bottom of the Weather Data Link Page. Softkeys control the display of weather information on most MFD pages and the PFD Inset Map.

When a weather product is selected for display, the corresponding softkey label changes to gray. This indicates that the product is enabled. Unavailable weather products have dimmed (disabled) softkey labels.

Figure 6-3 Weather Softkeys

LEGENDS

Each active weather product has its own legend which displays only on the Weather Data Link Page. Note that weather product legends are not interchangeable.

Viewing a weather legend:

1) Select the Map Page Group.
2) Select the Weather Data Link Page.
3) Press the **LEGEND** Softkey to display the legends for the displayed weather products.

   OR:

   On the Weather Data Link Page, press the **MENU** Key, which displays the Page Menu Options. Turn the **FMS** Knob to select 'Weather Legend' and press the **ENT** Key.
4) Turn the **FMS** Knob to scroll through the legends if more are available than fit in the window.
5) To return to the previous page and remove the legend window, press the **LEGEND** Softkey, the **ENT** or the **CLR** Key, or the **FMS** Knob.

NEXRAD

NOTE: *The TOPO and/or TERRAIN display and NEXRAD are mutually exclusive for all applicable maps.*

NEXRAD (NEXt-generation RADar) is a network of 158 high-resolution Doppler radar systems that are operated by the National Weather Service (NWS). Its technical name is WSR-88D.

NEXRAD data provides centralized meteorological information for the continental United States and selected overseas locations. The maximum range of a single NEXRAD radar site is 250 nautical miles. In addition to a wide array of services, the NEXRAD network provides important information about severe weather and air traffic safety.

NEXRAD data is not real-time. The lapsed time between collection, processing, and dissemination of NEXRAD images can be significant and may not reflect the current radar synopsis. Due to the inherent delays and the relative age of the data, it should be used for long-range planning purposes only. Never use NEXRAD data or any radar data to penetrate hazardous weather. Rather, use it in an early-warning capacity of pre-departure and enroute evaluation.

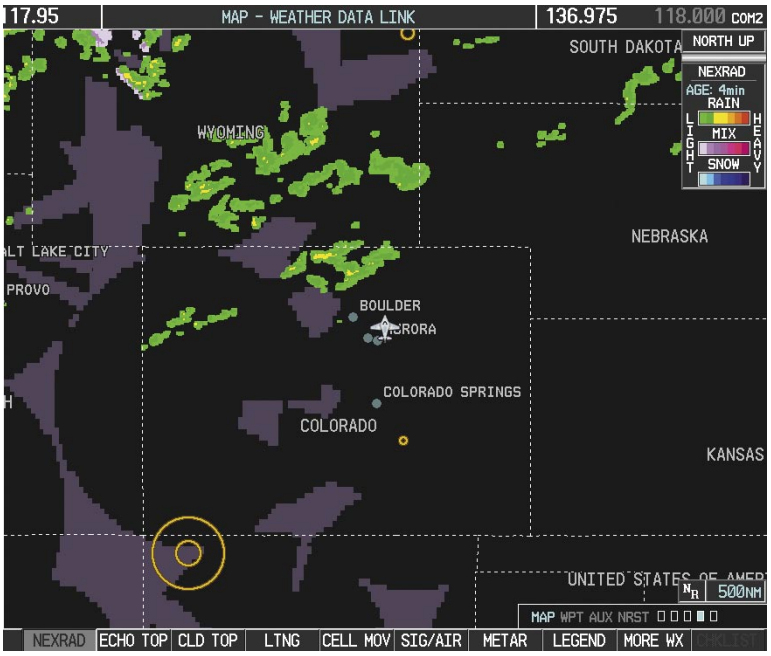


Figure 6-4 NEXRAD Data on the Weather Data Link Page

Press the **NEXRAD** Softkey to show NEXRAD weather and radar coverage information (Figure 6-4). NEXRAD data displays on the following maps:

- PFD Inset Map
- Weather Data Link Page
- Navigation Map
- Nearest Pages
- Airport Information Page
- AUX - Trip Planning Page
- Flight Plan Page

Displaying NEXRAD weather information:

1) Press the **MAP** Softkey. For the PFD Inset Map, press the **INSET** Softkey. This is not necessary on the Weather Data Link Page.
2) Press the **NEXRAD** Softkey.

Composite data from all the NEXRAD radar sites in the United States is shown. This data is composed of the maximum reflectivity from the individual radar sweeps. The display of the information is color-coded to indicate the weather severity level.

All weather product legends can be viewed on the Weather Data Link Page. For the NEXRAD legend (Figure 6-5), press the **LEGEND** Softkey when NEXRAD is selected for display.

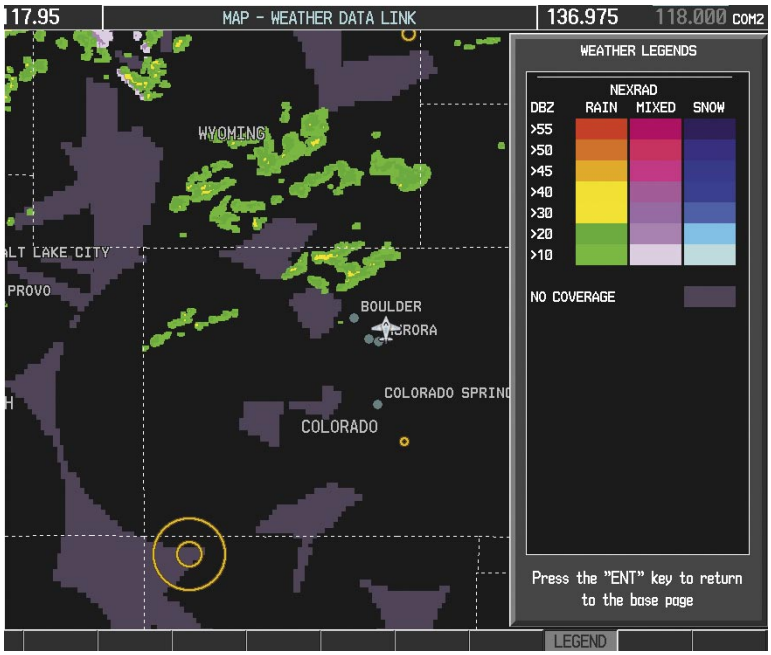


Figure 6-5 NEXRAD Data with Legend

The display of radar coverage is always active when either NEXRAD or ECHO TOPS is selected. The display indicates the currently available NEXRAD radar coverage and Echo Tops areas in a grayish-purple color where information is unavailable or is not being collected. This means that the radar capability exists in the grayish-purple areas, but that it is not active or is off-line.

Reflectivity

Reflectivity is the amount of transmitted power returned to the radar receiver. Colors on the NEXRAD display are directly correlative to the level of detected reflectivity. Reflectivity as it relates to hazardous weather can be very complex.

The role of radar is essentially to detect moisture in the atmosphere. Simply put, certain types of weather reflect radar better than others. The intensity of a radar reflection is not necessarily an indication of the weather hazard level. For instance, wet hail returns a strong radar reflection, while dry hail does not. Both wet and dry hail can be extremely hazardous.

The different NEXRAD echo intensities are measured in decibels (dB) relative to reflectivity (Z). NEXRAD measures the radar reflectivity ratio, or the energy reflected *back to* the radar receiver (designated by the letter Z). The value of Z increases as the returned signal strength increases.

NEXRAD Limitations

NEXRAD radar images may have certain limitations:

- NEXRAD base reflectivity does not provide sufficient information to determine cloud layers or precipitation characteristics (wet hail vs. rain). For example, it is not possible to distinguish between wet snow, wet hail, and rain.
- NEXRAD base reflectivity is sampled at the minimum antenna elevation angle. An individual NEXRAD site cannot depict high altitude storms at close ranges. It has no information about storms directly over the site.
- When zoomed in to a range of 30 nm, each square block on the display represents an area of four square kilometers. The intensity level reflected by each square represents the *highest* level of NEXRAD data sampled within the area (Figure 6-6).

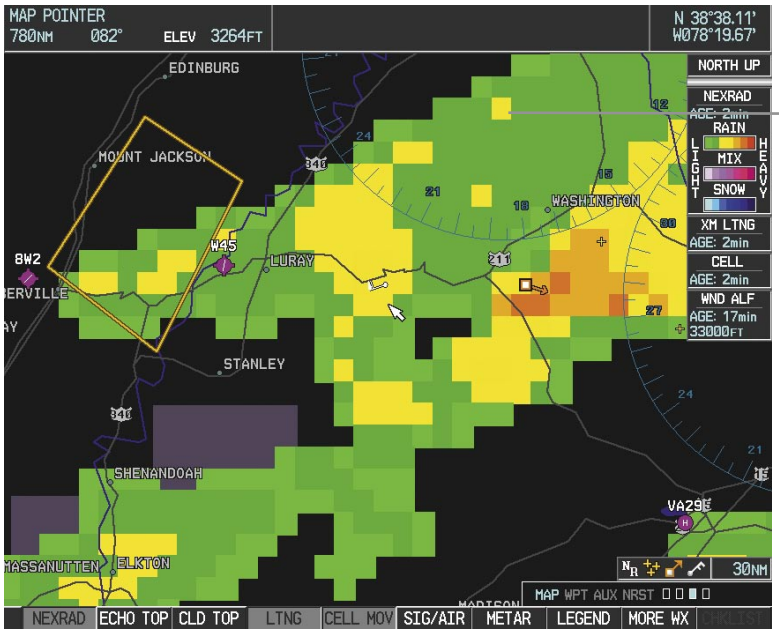


Figure 6-6 NEXRAD Data - Zoomed

NEXRAD radar images may display abnormalities:

- Ground clutter
- Strobes and spurious radar data
- Sun strobes (when the radar antenna points directly at the sun)
- Interference from buildings or mountains, which may cause shadows
- Metallic dust from military aircraft, which can cause alterations in radar scans

ECHO TOPS

NOTE: *Echo Tops is mutually exclusive with Cloud Tops and NEXRAD.*

Echo Tops data (Figure 6-7) shows the location, elevation, and direction of the highest radar echo. The highest radar echo does not indicate the top of a storm or clouds; rather it indicates the highest altitude at which precipitation is detected. The information is derived from NEXRAD data.

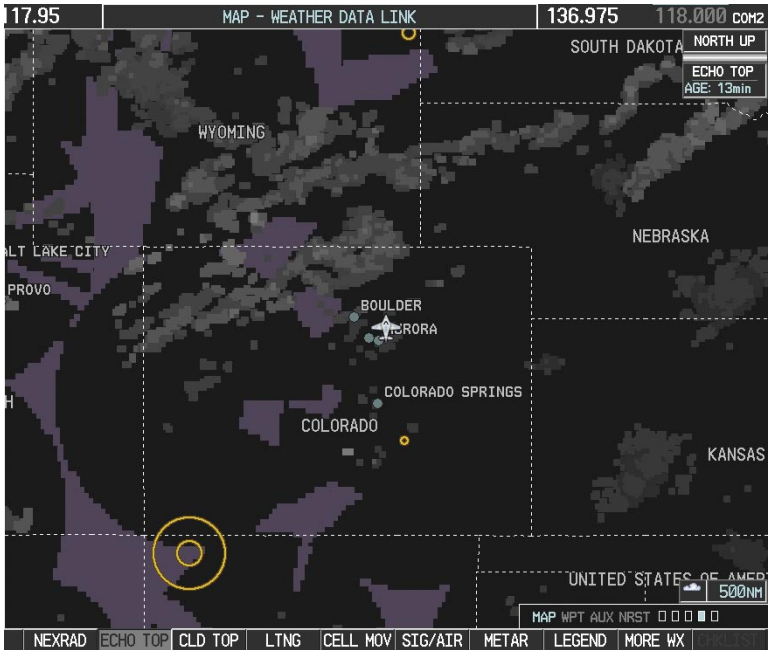


Figure 6-7 Echo Tops Data

Press the **ECHO TOP** Softkey to show data about the highest radar echo. Note that Cloud Tops and Echo Tops use the same color scaling to represent altitude. Cloud Tops and Echo Tops are mutually exclusive. When Echo Tops is activated, NEXRAD and Cloud Tops are removed.

Displaying Echo Tops information:

1) Select the Weather Data Link Page.
2) Press the **ECHO TOPS** Softkey.

Echo Tops data displays only on the Weather Data Link Page.

To display the Echo Tops legend (Figure 6-8), press the **LEGEND** Softkey when Echo Tops is selected for display.

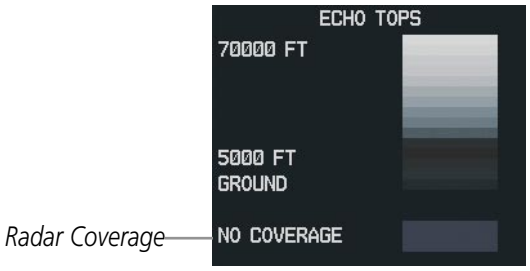


Figure 6-8 ECHO TOPS Legend

The display of radar coverage is always active when NEXRAD or Echo Tops is selected. The display indicates the currently available NEXRAD radar coverage and Echo Tops areas in a grayish-purple color where information is unavailable or is not being collected. This means that the radar capability exists in the grayish-purple areas, but that it is not active or is off-line.

CLOUD TOPS

NOTE: *Cloud Tops and Echo Tops cannot be turned on at the same time.*

Cloud Tops data (Figure 6-9) shows the altitude at the top of the clouds. This is determined from satellite imagery.

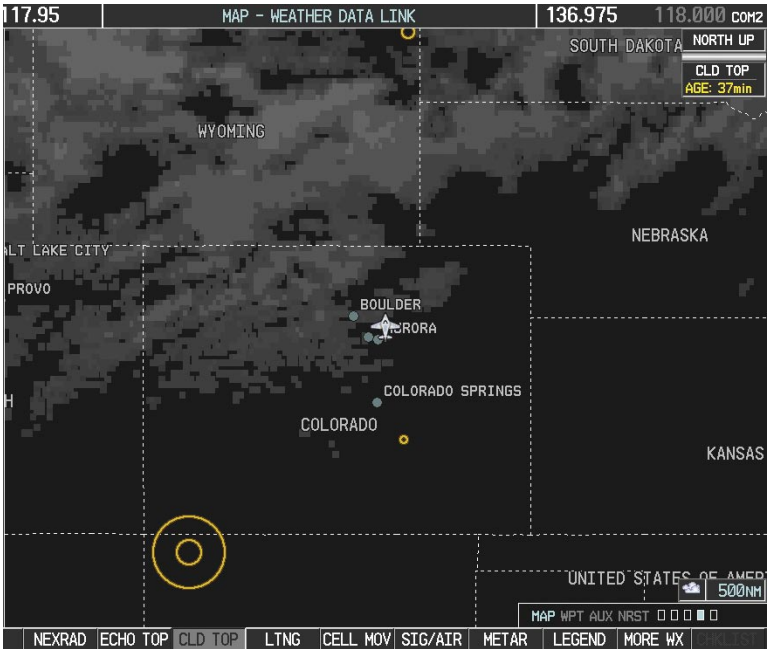


Figure 6-9 Cloud Tops Data

Displaying Cloud Tops information:

1) Select the Weather Data Link Page.

2) Press the **CLOUD TOPS** Softkey.

To display the Cloud Tops legend (Figure 6-10), press the **LEGEND** Softkey when Cloud Tops is selected for display.

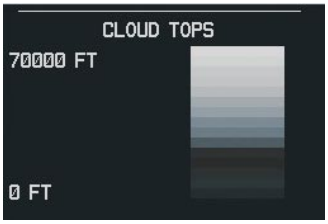


Figure 6-10 Cloud Tops Legend

XM LIGHTNING

Lightning data (Figure 6-11) shows the approximate location of cloud-to-ground lightning strikes. Strike location is shown within a two kilometer region. The exact location of the lightning strike is not displayed.

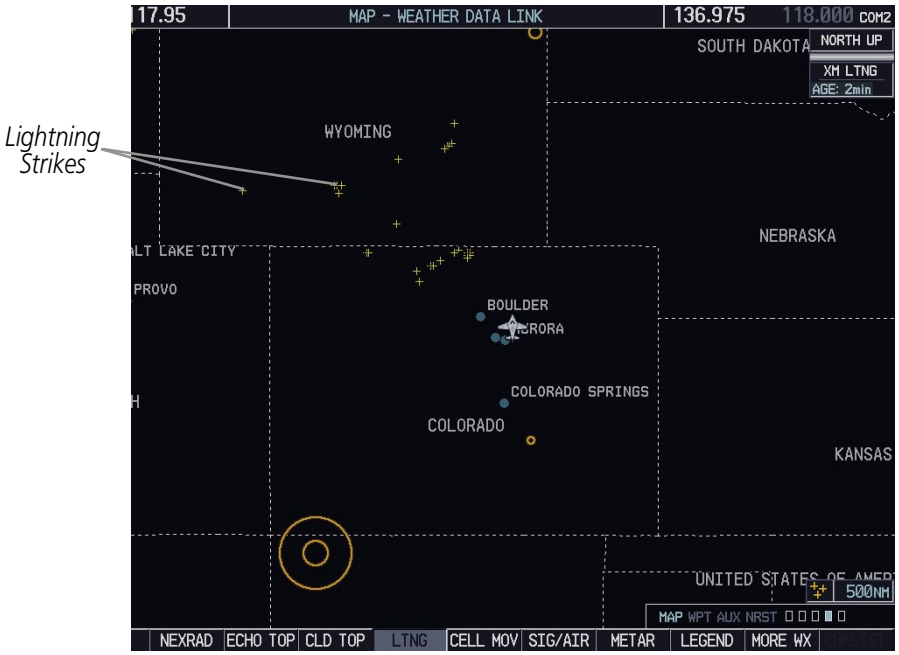


Figure 6-11 Lightning Data

Press the **LTNG** or **XM LTNG** Softkey to show the location of cloud-to-ground lightning strikes. Lightning data displays on the following maps:

- PFD Inset Map
- Weather Data Link Page
- Navigation Map
- Nearest Pages
- AUX - Trip Planning Page
- Flight Plan Pages (except VNAV)

Displaying XM Lightning information:

1) Press the **MAP** Softkey. For the PFD Inset Map, press the **INSET** Softkey. This is not necessary for the Weather Data Link Page.

2) Press the **XM LTNG** Softkey, or the **LTNG** Softkey for the Weather Data Link Page.

To display the XM Lightning legend (Figure 6-12), press the **LEGEND** Softkey when XM Lightning is selected for display.

Figure 6-12 Lightning Legend

CELL MOVEMENT

Cell Movement data (Figure 6-13) shows the location and movement of storm cells as identified by the ground-based system. The cells are represented by yellow squares, while the movement is represented by arrows.

Cell Movement data is shown with NEXRAD data on most maps. On the Weather Data Link Page, Cell Movement data is shown only when selected.

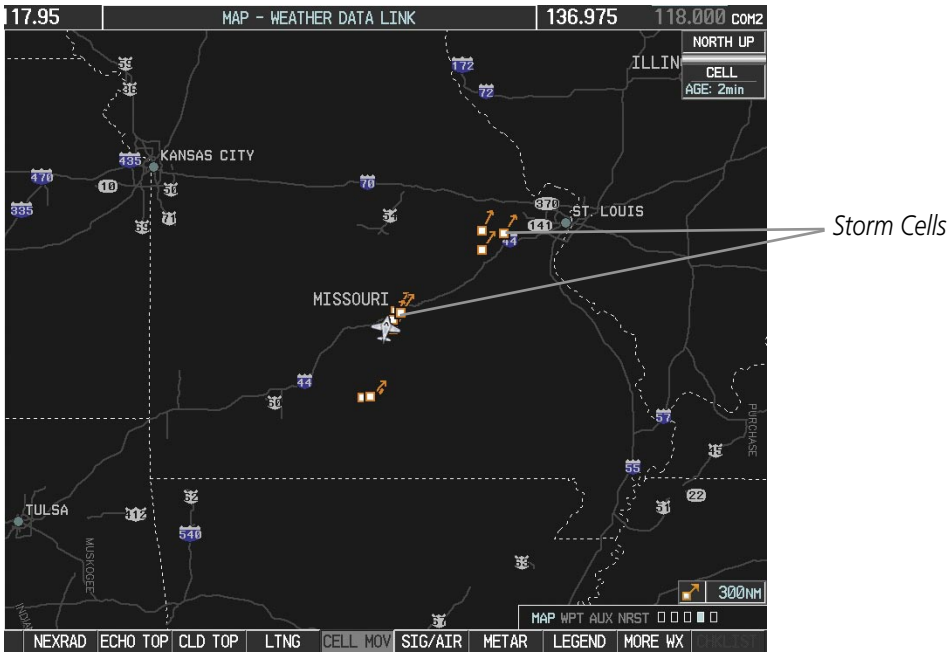


Figure 6-13 Cell Movement Data

Press the **CELL MOV** Softkey to show the storm cells on the Weather Data Link Page. Using the Map Setup Window, Cell Movement data displays on the following maps:

- PFD Inset Map
- Weather Data Link Page
- Navigation Map
- AUX - Trip Planning Page
- Nearest Pages

Displaying Cell Movement information:

1) Press the **MAP** Softkey. For the PFD Inset Map, press the **INSET** Softkey. This is not necessary for the Weather Data Link Page.
2) Press the **NEXRAD** Softkey or the **CEL MOV** Softkey for the Weather Data Link Page.

To display the Cell Movement legend, (Figure 6-14), press the **LEGEND** Softkey when Cell Movement is selected for display.

Figure 6-14 Cell Movement Legend

SIGMETS AND AIRMETS

SIGMETs (SIGnificant METeorological Information) and AIRMETS (AIRmen's METeorological Information) are broadcast for potentially hazardous weather that is considered of extreme importance to all aircraft. A Convective SIGMET is issued for hazardous convective weather. A localized SIGMET is a significant weather condition occurring at a localized geographical position.

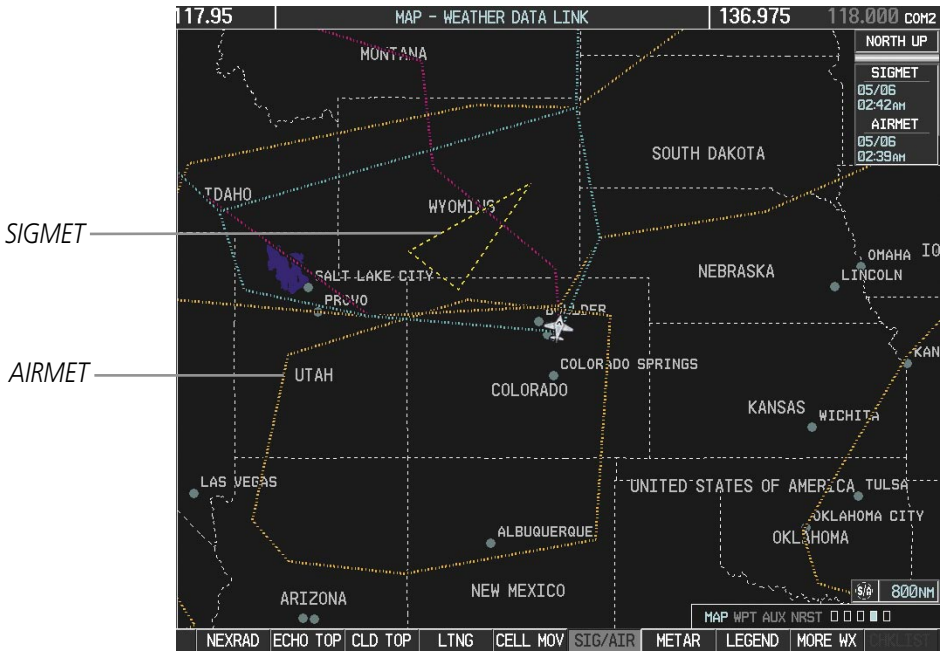


Figure 6-15 SIG/AIR Data

SIGMET and AIRMET data display on the Weather Data Link Page (Figure 6-15).

Displaying SIGMETs and AIRMETs:

1) Select the Weather Data Link Page.
2) Press the **SIG/AIR** Softkey.
3) To view the text of the SIGMET or AIRMET, press the **Joystick** and move it over the icon.
4) Press the **ENT** key.

To display the SIGMET and AIRMET legend (Figure 6-16), select the **LEGEND** Softkey when SIGMETs and AIRMETs are selected for display.

Figure 6-16 SIGMET/AIRMET Legend

Figure 6-17 shows sample SIGMET text.

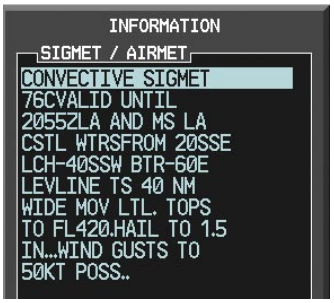


Figure 6-17 Sample SIGMET Text

METARS AND TAFS

NOTE: *The atmospheric pressure on the METAR is reported in hectopascals everywhere but in the US, where it is reported in inches of mercury. Temperatures are reported in Celsius. Standard temperature and atmospheric pressure are 15°C (59°F) and 29.92 in Hg (1013.2 hPa).*

NOTE: *METAR and City Forecast information is only displayed within the installed aviation database service area.*

METAR (METeorological Aerodrome Report) is the standard format for pre-flight weather briefings. METARs are updated hourly and are considered current. A typical METAR report contains information about the temperature, dew point, wind, precipitation, cloud cover, cloud heights, visibility, and barometric pressure. It can also contain information on precipitation amounts, lightning, and other critical data. METARs are shown as colored flags at airports that provide them.

By contrast, the TAF (Terminal Aerodrome Report) is the standard format for 24-hour weather forecasts. The TAF (Figure 6-18) may contain some METAR data, but it generally covers a smaller area. It typically forecasts significant weather changes, temporary changes, probable changes, and expected changes in weather conditions. METAR and TAF text are displayed on the Weather Data Link Page and the Weather Information Page.

Viewing METAR and TAF text for a selected airport:

1) On the Weather Data Link Page, press the **Joystick** and pan to the desired airport.
2) Press the **ENT** Key to display the Weather Information Page with METAR and TAF text.

OR:

1) Select the Weather Information Page and enter the desired airport.
   a) Select the Waypoint Page Group.
   b) Select the first rectangular page icon.
   c) Press the **WX** Softkey to select the Weather Information Page.
   d) Press the **FMS** Knob momentarily to display the cursor.
   e) Use the **FMS** Knob to enter the desired airport and press the **ENT** Key.
2) Use the **FMS** Knob or the **ENT** Key to scroll through the METAR and TAF text. Note that the METAR text must be completely scrolled through before scrolling through the TAF text.
3) Press the **FMS** Knob or the **CLR** Key to return to the Weather Data Link Page if the airport was selected by panning from this page.

METAR data is displayed first in a decoded fashion, then as raw text. TAF information is displayed only in its raw form.

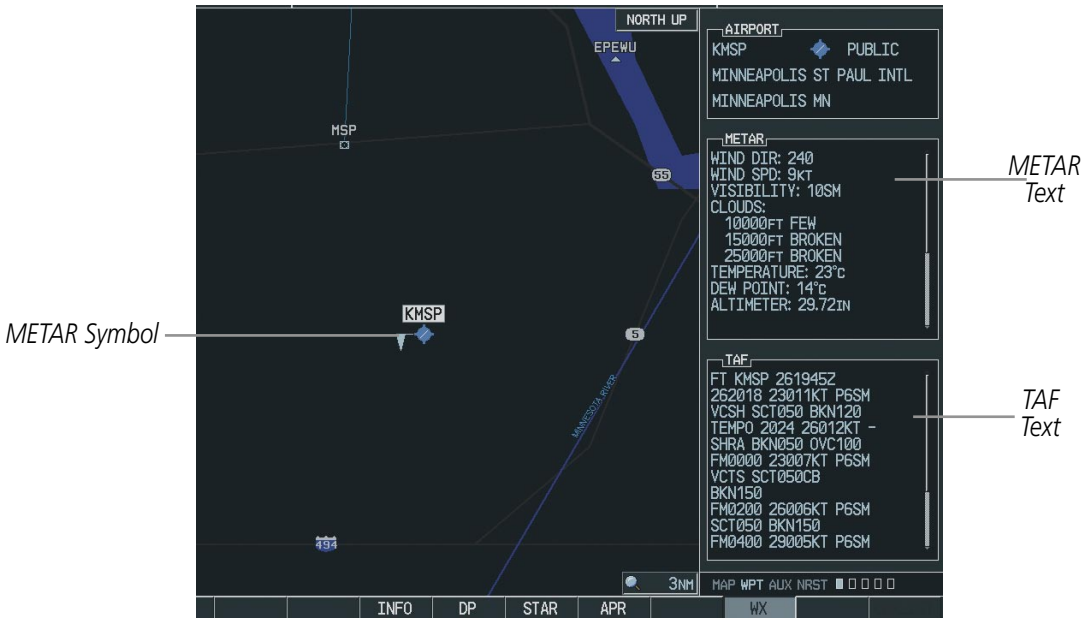


Figure 6-18 METAR and TAF Text on the Weather Information Page

To display the METAR legend (Figure 6-19), press the **LEGEND** Softkey when METARs are selected for display.

Figure 6-19 METAR Legend

SURFACE ANALYSIS AND CITY FORECAST

NOTE: *Surface Analysis and City Forecast information display together. They only display within the installed Aviation Database service area.*

Surface Analysis and City Forecast information is available for current and forecast weather conditions. Forecasts are available for intervals of 12, 24, 36, and 48 hours (Figure 6-20 - 6-23). Surface Analysis and City Forecast information display on the Weather Data Link Page.

Figure 6-20 Current Surface Analysis Data

Figure 6-21 12-Hour Surface Analysis Data

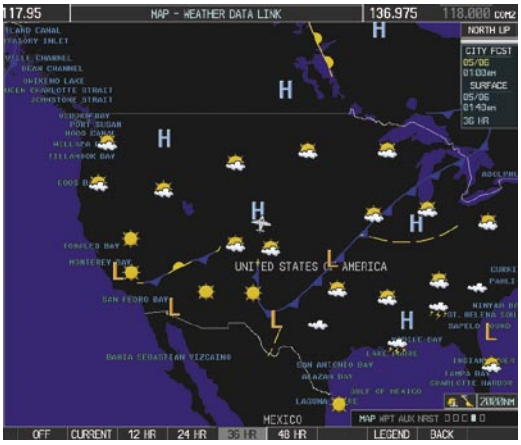


Figure 6-22 36-Hour Surface Analysis Data

Figure 6-23 48-Hour Surface Analysis Data

Displaying Surface Analysis and City Forecast information:

1) Select the Weather Data Link Page.
2) Press the **MORE WX** Softkey.
3) Press the **SFC** Softkey.
4) Select the forecast time: **CURRENT**, **12 HR**, **24 HR**, **36 HR**, or **48 HR**. The **SFC** Softkey label changes to reflect the forecast time selected.

To display the Surface Analysis (Figure 6-24) and City Forecast legend, press the **LEGEND** Softkey when Surface Analysis and City Forecast are selected to be displayed.

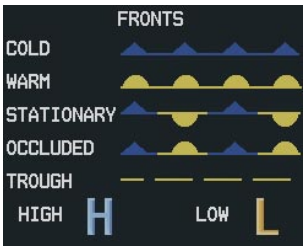


Figure 6-24 Surface Analysis Legend

FREEZE LEVEL

Freeze Level data shows the color-coded contour lines for the altitude and location at which the first isotherm is found (Figure 6-25). When no data is displayed for a given altitude, the data for that altitude has not been received, or is out of date and has been removed from the display. New data appears at the next update.

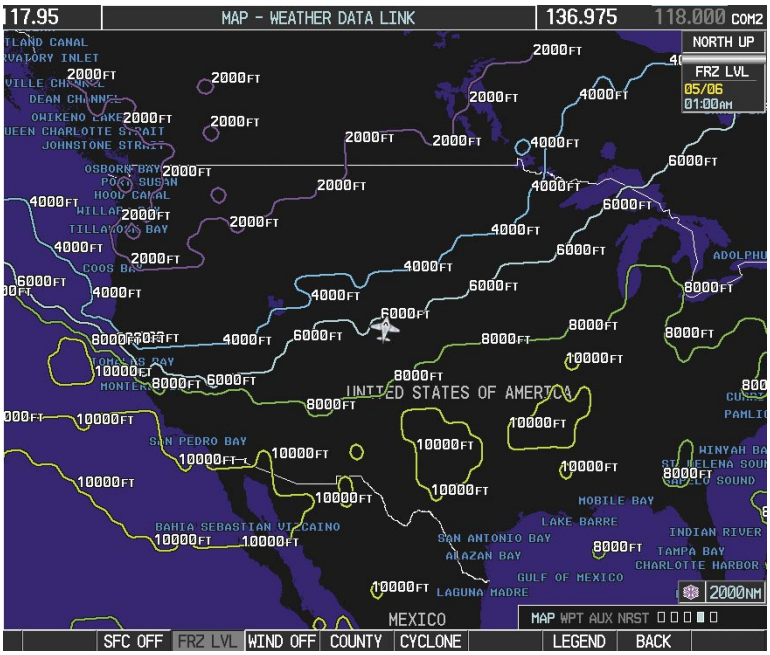


Figure 6-25 Freeze Level Data

Displaying Freeze Level information:

1) Select the Weather Data Link Page.
2) Press the **MORE WX** Softkey.
3) Press the **FRZ LVL** Softkey.

Freeze Level data displays on the Weather Data Link page only. It does not display on other G1000 maps.

To display the Freeze Level legend (Figure 6-26), press the **LEGEND** Softkey when Freeze Level is selected to be displayed.

Figure 6-26 Freeze Level Legend

WINDS ALOFT

Winds Aloft data (Figure 6-27) shows the forecasted wind speed and direction at the surface and at selected altitudes. Altitude can be displayed in 3,000-foot increments up to 42,000 feet MSL.

Displaying Winds Aloft data:

1) Press the **MORE WX** Softkey.

2) Press the **WIND** Softkey.

a) Press the **SFC** Softkey to display the surface wind speed and directions.

b) Press any numbered softkey to display the winds at an altitude in 3,000 foot increments. The **WIND** Softkey label changes to reflect the altitude selected.

c) Press the **NEXT** or **PREV** Softkey to display additional altitude softkeys.

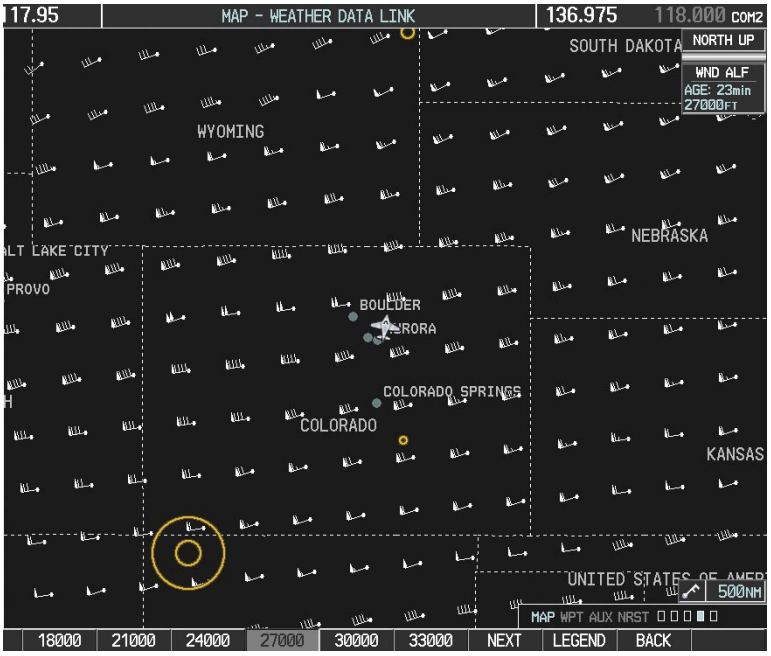


Figure 6-27 Winds Aloft Data at 27,000 Feet

To display the Winds Aloft legend (Figure 6-28), select the **LEGEND** Softkey when Winds Aloft is selected for display.

Figure 6-28 Winds Aloft Data with Legend

COUNTY

County data (Figure 6-29) provides specific public awareness and protection weather warnings from the National Weather Service (NWS). This can include information on fires, tornadoes, severe thunderstorms, flood conditions, and other natural disasters.

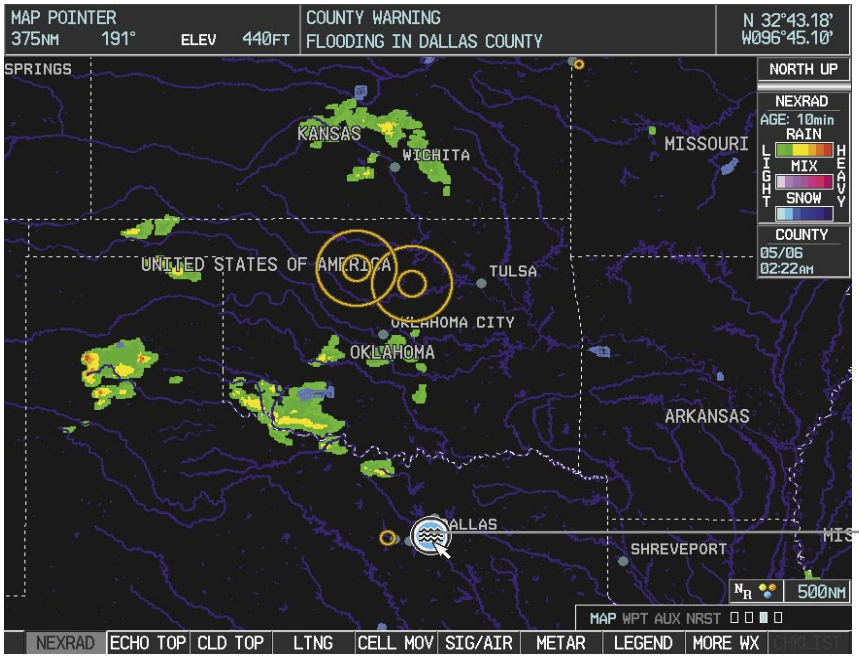


Figure 6-29 County Flood Warning

Displaying County Warning information:

1) Select the Weather Data Link Page.
2) Press the **MORE WX** Softkey.
3) Press the **COUNTY** Softkey.

County warnings display only on the Weather Data Link Page. They do not display on other G1000 maps.

To display the County legend (Figure 6-30), press the **LEGEND** Softkey when County warnings are selected to be displayed.

Figure 6-30 County Warnings Legend

CYCLONE

Cyclone data shows the current location of cyclones (hurricanes) and their projected track. The forecasted track can be displayed at various time intervals.

Displaying Cyclone (hurricane) track information:

1) Select the Weather Data Link Page.
2) Press the **MORE WX** Softkey.
3) Press the **CYCLONE** Softkey.

Cyclone data displays only on the Weather Data Link Page. It does not display on other G1000 maps.

To display the Cyclone legend (Figure 6-31), press the **LEGEND** Softkey when Cyclones are selected to be displayed.

Figure 6-31 Cyclone Legend

SETTING UP THE WEATHER DATA LINK PAGE

The display of weather data on the Weather Data Link Page can be set up and customized by using the Data Link Menu (Figure 6-32). Weather legends for all active products can also be accessed from the Data Link Menu.

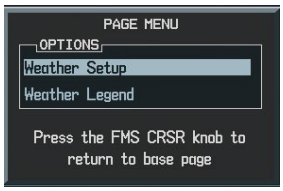


Figure 6-32 Data Link Menu

Figure 6-33 shows the Data Link Setup Window. The 'ON' and 'OFF' settings control the display of weather products the same way that softkeys do.

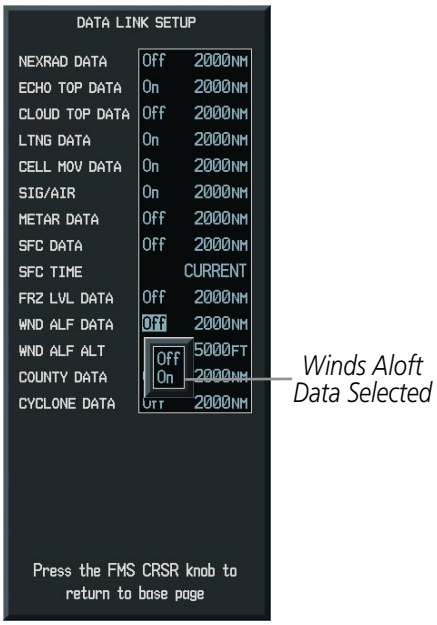


Figure 6-33 Data Link Setup Window

The selected range settings on the Data Link Setup Window control the largest map range at which each weather product displays on the Weather Data Link Page. Table 6-3 lists every map range option for all XM WX Satellite Weather products.

Data	Range Options (in nm unless otherwise indicated)														
NEXRAD Data	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000
Echo Top Data	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000
Cloud Top Data	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000
LTNG Data	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000
CELL MOV Data	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000
SIG/AIR	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000
METAR Data	1	1.5	2	3	5	8	10	15	20	30	15	80	100	200	300
METAR (cont.)	500	800	1000	1500	2000	3000	5000								
SFC Data	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000
FRZ LVL Data	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000
WND ALF Data	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000
COUNTY Data	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000
CYCLONE Data	10	15	20	30	50	80	100	150	200	300	500	800	1000	1500	2000

Table 6-3 Map Range Settings

Setting up and customizing the Weather Data Link Page:

1) On the Weather Data Link Page, press the **MENU** Key.

2) While the Weather Setup selection is highlighted, press the **ENT** Key.

3) Turn the large **FMS** Knob or press the **ENT** Key to highlight and move between the products.

4) Turn the small **FMS** Knob to move between the options for each product (for example, 'Yes', 'No', or Map Range).

5) Press the **ENT** Key to select an option.

6) Press the **MENU** Key to restore the default settings.

Map Panning on the Weather Data Link Page

Map panning (Figure 6-34) moves the map beyond its current limits without adjusting the map range. Press the **Joystick** to select the map panning feature.

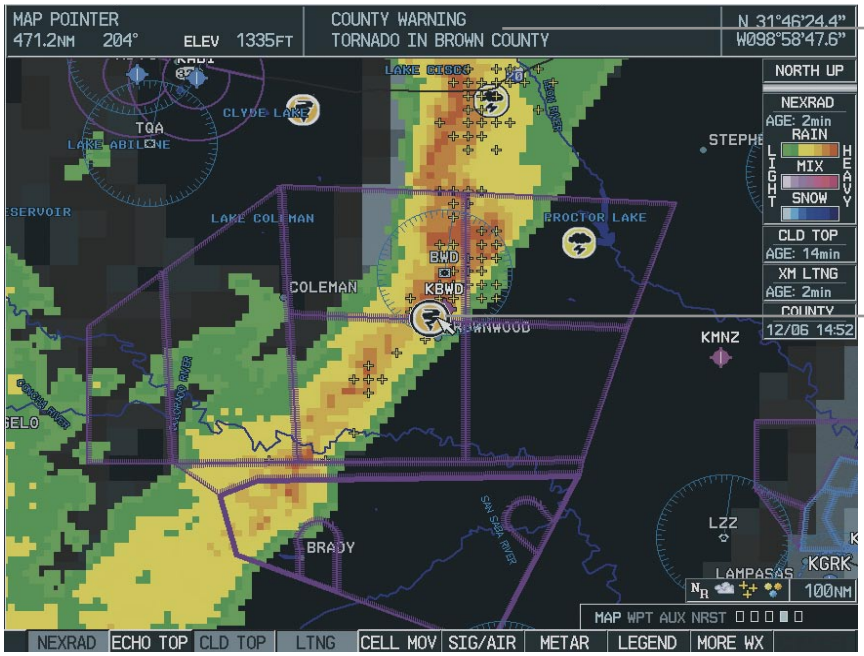


Figure 6-34 Panning on the Weather Data Link Page

When map panning is enabled, a panning arrow flashes on the Weather Data Link Page. Panning over AIRMETs, County Warnings, TFRs (Temporary Flight Restrictions), Echo Tops, METARs, SIGMETs, and Cell Movement displays text information for the selection. This information is displayed in the same location as the map pointer information on the Navigation Map Page.

SETTING UP XM WEATHER ON THE NAVIGATION MAP

When appropriately configured, the Navigation Map displays NEXRAD, Cell Movement, TFRs, and XM Lightning data as shown in Figure 6-35. This improves situational awareness and makes it easier to relate storm activity to airports, NAVAIDS, obstacles, and other ground references.

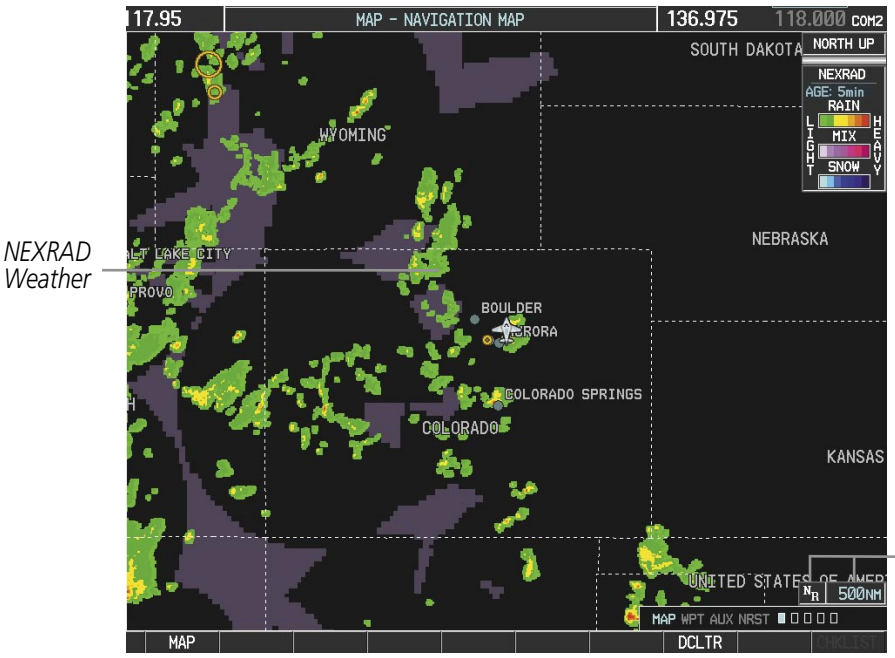


Figure 6-35 Navigation Map Page Displaying NEXRAD Weather

XM WEATHER ON THE NAVIGATION MAP

Use the Map Setup Window (Figure 6-36) to customize the display of weather data on the Navigation Map Page. The Map Setup Window settings control the display of weather data on all G1000 pages except the Weather Data Link Page.

Figure 6-36 Map Setup Options

Setting up and customizing weather data on the Navigation Map Page:

1) On the Navigation Map Page, press the **MENU** Key.
2) While the 'Map Setup' selection is highlighted, press the **ENT** Key.
3) Turn the small **FMS** Knob to display the group selection window. Turn the small **FMS** Knob to select 'Weather Group', and press the **ENT** Key.
4) Turn the large **FMS** Knob to highlight and move between the product selections.
5) When an item is highlighted, turn the small **FMS** Knob to select the desired option.
6) Press the **ENT** Key.

The following options are available:

- **NEXRAD DATA** – Turns the display of NEXRAD data and radar coverage on or off. Selects the display range.
- **XM LTNG** – Turns the display of XM Lightning on or off. Selects the display range.
- **CELL MOVEMENT** – Turns the display of storm cell movement on or off. Cell Movement is shown only when NEXRAD is turned on.

6.2 STORMSCOPE (WX-500)

NOTE: *The Stormscope system is not intended for hazardous thunderstorm penetration. Weather information on the G1000 MFD is approved for weather avoidance only. Refer to the WX-500 User's Guide for a detailed description of Stormscope operation.*

The following pages can display Stormscope data:

- PFD Inset Map
- Stormscope Page
- Navigation Map
- AUX - Trip Planning Page
- Nearest Pages

To display Stormscope data on any map besides the Stormscope Page, press the **MAP** Softkey (or the **INSET** Softkey for the PFD Inset Map), then press the **STRMSCP** Softkey. These pages can also display cell or strike data using the yellow lightning strike symbology shown in Table 6-4.

Lightning Age	Symbol
Strike is less than 6 seconds old	
Strike is between 6 and 60 seconds old	
Strike is between 1 and 2 minutes old	
Strike is between 2 and 3 minutes old	

Table 6-4 Lightning Age and Symbols

SETTING UP STORMSCOPE ON THE NAVIGATION MAP

Setting up Stormscope options on the Navigation Map:

1) On the Navigation Map Page, press the **MENU** Key.
2) With 'Map Setup' selected (Figure 6-37), press the **ENT** Key.
3) Turn the small **FMS** Knob to display the group selection window. Turn the small **FMS** Knob to select 'Weather' (Figure 6-38), and press the **ENT** Key.
4) Turn the large **FMS** Knob to highlight and move between the product selections.
5) When an item is highlighted, turn the small **FMS** Knob to select the option.
6) Press the **ENT** Key.
7) Press the **FMS** Knob to return to the Navigation Map Page (Figure 6-39).

The following options are available (Figure 6-38):

- **STRMSCP LTNG –** Turns the display of Stormscope data on or off.
- **STRMSCP MODE –** Selects the CELL or STRIKE mode of lightning activity. Cell mode identifies clusters or cells of electrical activity. Strike mode indicates the approximate location of lightning strikes.
- S**TRMSCP SMBL –** Selects the range at which Stormscope data displays.

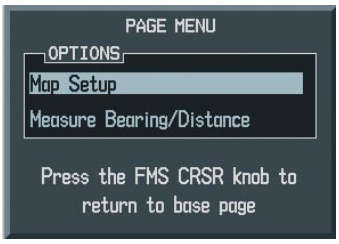


Figure 6-37 Page Menu

Figure 6-38 Map Setup Menu

CELL AND STRIKE MODE ON THE NAVIGATION MAP

On the Navigation Map, cell mode identifies cells of lightning activity (Figure 6-39). Stormscope identifies clusters of electrical activity that indicate cells. Strike mode indicates the approximate location of lightning strikes.

Selecting the 'cell' or 'strike' mode on the Navigation Map:

1) Press the **MENU** Key.
2) With 'Map Setup' selected, press the **ENT** Key.
3) Select the 'Weather' group.
4) Press the **ENT** Key. The cursor flashes on 'STRMSCP LTNG'.
5) Turn the **large FMS** Knob to select 'STRMSCP MODE'.
6) Turn the **small FMS** Knob to change between 'CELL' and 'STRIKE' options. When an item is selected, press the **ENT** Key.
7) Press the **FMS** knob to return to the Navigation Map Page.

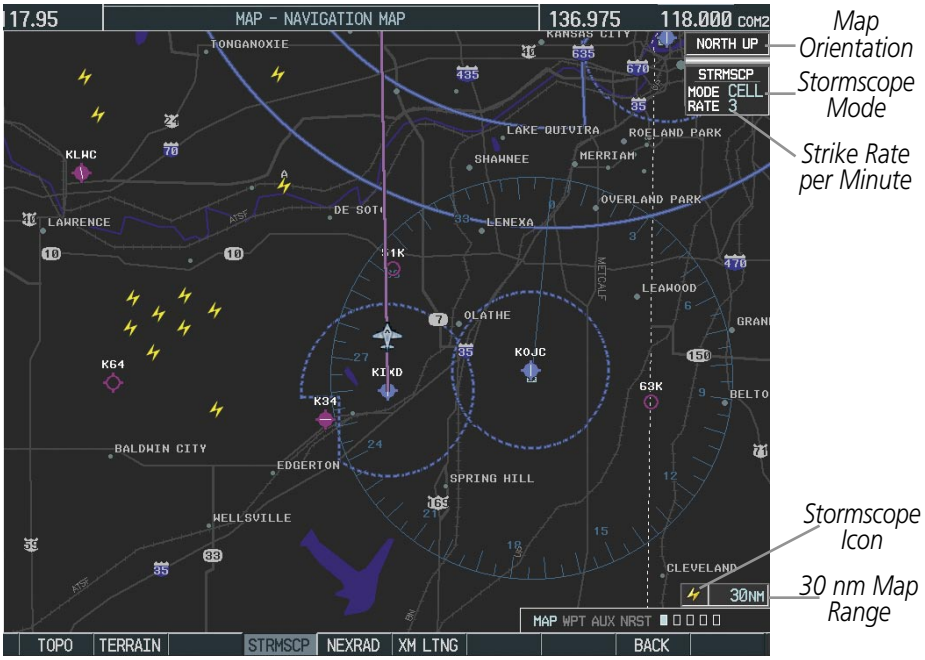


Figure 6-39 Navigation Map Page with Stormscope Lightning Data

If heading input is lost, strikes and/or cells must be cleared manually after the execution of each turn (Figure 6-40). This is to ensure that the strike and/or cell positions are depicted accurately in relation to the nose of the aircraft.

Manually clearing Stormscope data on the Navigation Map:

1) Press the **MENU** Key.
2) Select 'Clear Stormscope Lightning'.
3) Press the **ENT** Key.

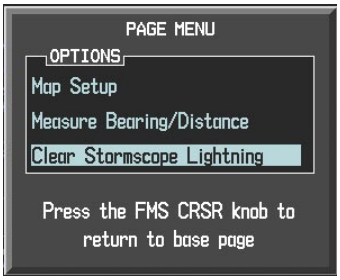


Figure 6-40 Navigation Map Page Options Menu

ZOOM RANGE ON THE NAVIGATION MAP

Stormscope lightning data can be displayed up to 800 nm zoom range (in North Up orientation) on the Navigation Map Page. However, in Track Up orientation at the 500 nm range, a portion of Stormscope lightning data can be behind the aircraft and therefore not visible on the Navigation Map. Since the range for Stormscope data is 400 nm diameter total (200 nm in front and 200 nm behind), the 500 nm range in North Up orientation shows all the data.

At a map range of less than 25 nm, Stormscope lightning data is not displayed, but can still be present. The presence of Stormscope lightning data is indicated by the annunciation 'LTNG < 25 nm' in the upper right corner (Figure 6-41).

Figure 6-41 Lightning Display Range Annunciation

The maximum zoom range can also be set on the Navigation Map. Note that Stormscope data above the selected maximum zoom range is decluttered.

Selecting a Stormscope range on the Navigation Map:

1) Press the **MENU** Key.
2) Select 'MAP SETUP'.
3) Select the 'Weather' group.
4) Press the **ENT** Key.
5) Turn the large **FMS** Knob to select 'STRMSCP SMBL'.
6) Turn the small **FMS** Knob to select the maximum display range.
7) Press the **ENT** Key.
8) Press the **FMS** Knob to return to the Navigation Map Page.

To change the display range on the Navigation Map Page, turn the **Joystick** clockwise to zoom out or counter-clockwise to zoom in.

SELECTING THE STORMSCOPE PAGE

If Stormscope is installed, the Stormscope Page is the third rectangular icon in the Map group of pages. Stormscope lightning data can be displayed at the ranges of 25 nm, 50 nm, 100 nm, and 200 nm.

Adjusting the Stormscope Map Range:

1) Select the Stormscope Page.
2) To change the map range, turn the **Joystick** clockwise to zoom out or counter-clockwise to zoom in.

Figure 6-42 Stormscope Page

Changing between 'cell' and 'strike' mode:

1) Select the Stormscope Page.
2) Press the **MODE** Softkey. The **CELL** and **STRIKE** softkeys are displayed.
3) Press the **CELL** Softkey to display 'CELL' data or press the **STRIKE** Softkey to display 'STRIKE' data. 'CELL' or 'STRIKE' is displayed in the mode box in the upper left corner of the Stormscope Page.
4) Press the **BACK** Softkey to return to the Stormscope Page.

OR:

1) Select the Stormscope Page.
2) Press the **MENU** Key.
3) Turn the **small FMS** Knob to choose between 'CELL' and 'STRIKE' options.
4) When an item is selected, press the **ENT** Key.

If heading input is lost, strikes and/or cells must be cleared manually after the execution of each turn (Figure 6-43). This is to ensure that the strike and/or cell positions are depicted accurately in relation to the nose of the aircraft.

Manually clearing Stormscope data:

1) Select the Stormscope Page.
2) Press the **MENU** Key.
3) Select 'Clear Stormscope Lightning'.
3) Press the **ENT** Key.

OR:

1) Select the Stormscope Page.
2) Press the **CLEAR** Softkey.

Figure 6-43 Navigation Map Page Options Menu

Changing the viewing mode between 360˚ and 120˚:

1) Select the Stormscope Page.
2) Press the **VIEW** Softkey. The **360** and **ARC** softkeys are displayed. Press the **360** Softkey to display a 360˚ viewing area or press the **ARC** Softkey to display a 120˚ viewing area.
3) Press the **BACK** Softkey to return to the Stormscope Page.

OR:

1) Select the Stormscope Page.
2) Press the **MENU** Key.
3) Turn the **small FMS** Knob to choose between 'View Arc' and 'View 360˚ options.
4) When an item is selected, press the **ENT** Key.

6.3 TERRAIN PROXIMITY

WARNING: *Do not use Terrain Proximity information for primary terrain avoidance. Terrain Proximity is intended only to enhance situational awareness.*

NOTE: *Terrain data is not displayed when the aircraft latitude is greater than 75° North or 60° South.*

NOTE: *Terrain Proximity is only available when TAWS is not enabled.*

G1000 Terrain Proximity is a non-TSO-C151b-certified terrain awareness system. It increases situational awareness and aids in reducing controlled flight into terrain (CFIT).

Do not confuse Terrain Proximity with Terrain Awareness and Warning System (TAWS). TAWS is more sophisticated and robust, and it is TSO-C151b certified. Terrain Proximity does not provide warning annunciations or voice alerts. It only provides color indications on map displays when terrain and obstacles are within a certain altitude threshold from the aircraft. Although the terrain and obstacle color map displays are the same, TAWS uses more sophisticated algorithms to assess aircraft distance from terrain and obstacles.

REQUIREMENTS

Terrain Proximity requires the following components to operate properly:

- Valid 3-D GPS position
- Valid terrain/obstacle database

LIMITATIONS

Terrain Proximity displays altitudes of terrain and obstructions relative to the aircraft position and altitude with reference to a database that may contain inaccuracies. Terrain and obstructions are shown only if they are in the database. Terrain and obstacle information should be used as an aid to situational awareness. They should never be used to navigate or maneuver around terrain.

Note that all obstructions may not be available in the terrain and obstacle database. No terrain and obstacle information is shown without a valid 3-D GPS position.

GPS POSITION AND GPS-MSL ALTITUDE

The G1000 GPS receiver provides the horizontal position and altitude. GPS altitude is derived from satellite position. GPS altitude is then converted to a mean sea level (MSL)-based altitude (GPS-MSL altitude) and is used to determine terrain and obstacle proximity. GPS-MSL altitude accuracy is affected by satellite geometry, but is not subject to variations in pressure and temperature that normally affect pressure altitude sensors. GPS-MSL altitude does not require local altimeter settings to determine MSL altitude. It is a widely-used MSL altitude source.

Terrain and obstacle databases are referenced to MSL. Using the GPS position and altitude, the Terrain Proximity feature portrays a 2-D picture of the surrounding terrain and obstacles relative to the position and altitude of the aircraft. GPS position and GPS-MSL altitude are used to calculate and predict the aircraft's flight

path in relation to the surrounding terrain and obstacles. In this way, the pilot can view predicted dangerous terrain and obstacle conditions.

DISPLAYING TERRAIN PROXIMITY DATA

TERRAIN PROXIMITY SYMBOLS

The symbols and colors in Figure 6-44 and Table 6-5 are used to represent obstacles and aircraft altitude when the Terrain Proximity Page is selected for display. Terrain Proximity uses black, yellow, and red to represent terrain information relative to aircraft altitude.

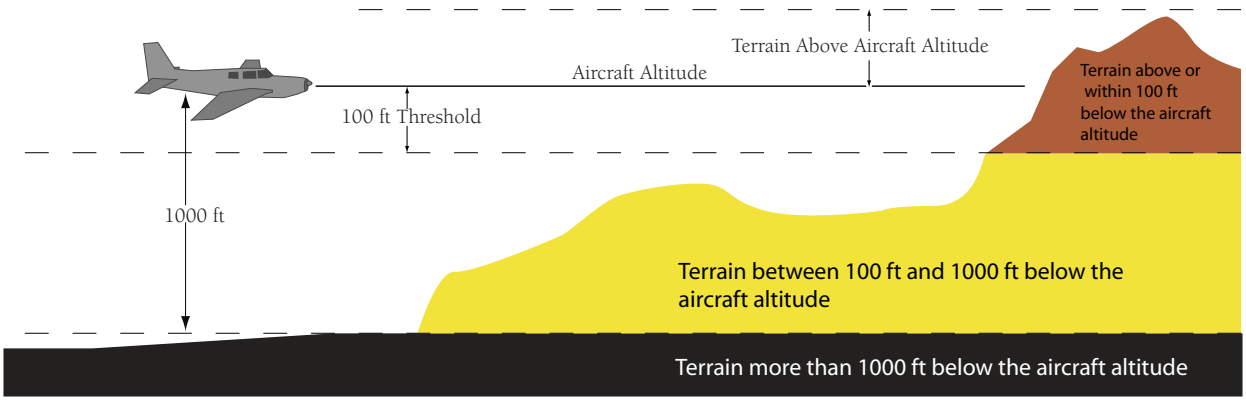

Terrain Above Aircraft Altitude
Aircraft Altitude
100 ft Threshold
1000 ft
Terrain above or within 100 ft below the aircraft altitude
Terrain between 100 ft and 1000 ft below the aircraft altitude
Terrain more than 1000 ft below the aircraft altitude

Figure 6-44 Terrain Altitude/Color Correlation for Terrain Proximity

The color of each obstacle is associated with the altitude of the aircraft. The color of the terrain also uses these color assignments.

	Unlighted Obstacle		Lighted Obstacle		Obstacle Location
	< 1000' AGL	> 1000' AGL	< 1000' AGL	> 1000' AGL	
Obstacle Symbol					Obstacle above or within 100 ft below the aircraft altitude
					Obstacle between 100 ft and 1000 ft below the aircraft altitude

Table 6-5 Terrain Proximity Terrain/Obstacle Colors and Symbology

Terrain and obstacle information can be displayed on the following pages:

- Terrain Proximity Page
- Navigation Map
- PFD Inset Map
- AUX - Trip Planning Page
- Flight Plan Pages (except VNAV)

To display terrain and obstacle data on any page other than the Terrain Proximity Page:

1) Press the **MAP** Softkey,
2) Press the **TERRAIN** Softkey.

Obstacles with heights greater than 200 feet above ground level (AGL) are displayed in three color levels (Table 6-5). The G1000 adjusts colors automatically as the aircraft altitude changes.

Terrain Proximity may also be deselected from the Inset Map without affecting the terrain display on the MFD maps.

Obstacles are displayed only at certain map zoom ranges, on certain maps, and will only be displayed if an obstacle database is loaded on the SD card. In addition, all map zoom ranges are dependent on the zoom range setting in the Navigation Map. If the zoom range on the Navigation Map is adjusted to below 20 nm, the highest zoom range on all other maps is also adjusted proportionally. Table 6-6 shows the highest zoom range at which obstacles are displayed on each page.

Map	Range (nm)
Navigation Map Page	50
Inset Map	10
Terrain Proximity Page	10
AUX - Trip Planning Page	10
Active Flight Plan Pages	15

Table 6-6 Zoom Ranges for Displaying Obstacle Data

If an obstacle and the projected flight path intersect, the Terrain Proximity Page automatically zooms in to place the potential point of impact on the display.

TERRAIN PROXIMITY PAGE

The Terrain Proximity Page is in the MAP group of pages and displays the following:

- Current aircraft location
- GPS-derived MSL altitude in increments of 20 feet or 10 meters, depending on unit configuration.
- Range marking rings (1 nm, 1 and 2 nm, 2.5 and 5 nm, 5 and 10 nm, 12.5 and 25 nm, 25 and 50 nm, 50 and 100 nm, 100 and 200 nm)
- Map Orientation (North Up, Track Up, DTK Up, HDG Up) - Displays 'HDG Up' map data unless there is no valid heading
- Terrain - Displays information relative to current aircraft altitude
- Terrain Legend - Indicates the terrain elevation in colors relative to the aircraft altitude

Displaying terrain and obstacles on the Terrain Proximity Page:

1) Turn the large **FMS** Knob to select the Map Page Group.

2) Turn the small **FMS** Knob to select the last rectangular page icon.

3) Turn the **Joystick** clockwise to display a larger area or counter-clockwise to display a smaller area.

There are two terrain/obstacle viewing options available (relative to the position of the aircraft), the 360° default display and the radar-like ARC (120°) display.

Figure 6-45 Terrain Proximity Page

Changing the viewing mode between 360° and ARC:

1) Select the Terrain Proximity Page.
2) Press the **VIEW** Softkey.
3) Press the **360** or **ARC** Softkey to select the desired view.

OR:

1) Press the **MENU** Key. The page menu is displayed with either 'View 120°' or 'View 360°'.
2) Press the **ENT** Key to change the view.

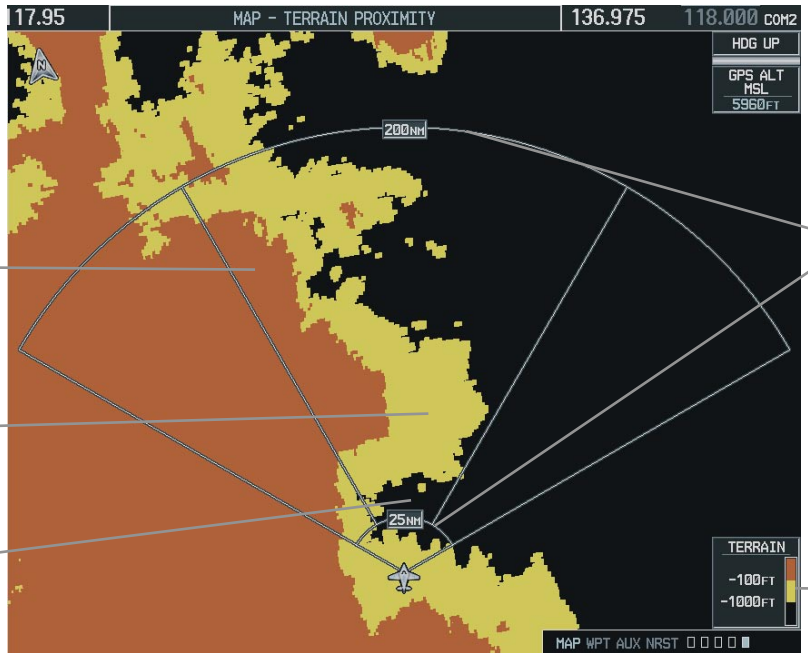


Figure 6-46 Terrain Proximity Page (ARC View)

Other aviation information such as airports, VORs, and other NAVAIDS can be displayed on the Terrain Proximity Page.

Showing or hiding aviation information:

1) Press the **MENU** Key.
2) Select 'Show (or Hide) Aviation Data'.
3) Press the **ENT** Key.

NAVIGATION MAP PAGE

Terrain and obstacle data can be displayed on the Navigation Map Page. Obstacles are shown on the Navigation Map Page at or below the map range that is configured.

Displaying Terrain Proximity data on the Navigation Map Page:

1) Press the **MAP** Softkey.
2) Press the **TERRAIN** Softkey to display the terrain and obstacle data on the Navigation Map Page.

Displaying obstacle information:

1) Press the **MAP** Softkey.
2) Press the **TERRAIN** Softkey to display the terrain and obstacle data on the Navigation Map Page.
3) Press the **Joystick** and move the panning arrow over the obstacle icon.
4) Press the **ENT** key.

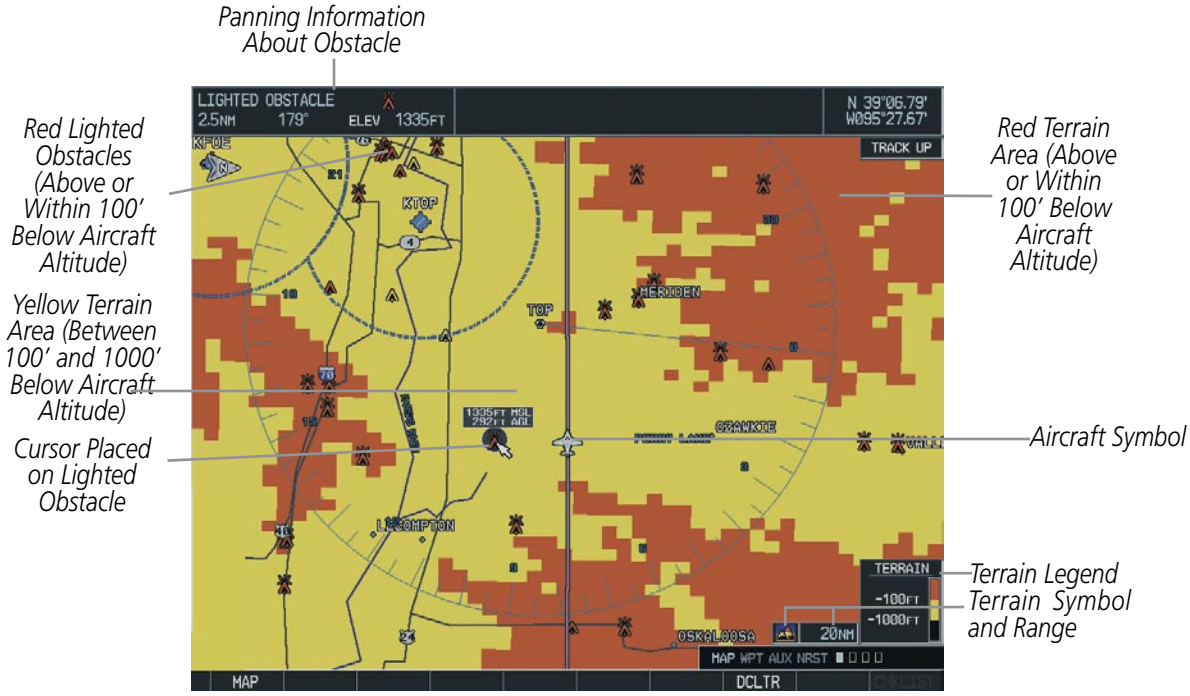


Figure 6-47 Terrain Information on the Navigation Map Page

SETTING UP TERRAIN PROXIMITY ON THE NAVIGATION MAP PAGE

Use the Map Setup Window (Figure 6-48) to customize the display of obstacle and terrain data on the Navigation Map Page. Data displays only if it is enabled.

Customizing terrain and obstacle display on the Navigation Map Page:

1) On the Navigation Map Page, press the **MENU** Key.
2) While the 'Map Setup' selection is highlighted on the Page Menu, press the **ENT** Key.
3) Turn the small **FMS** Knob to display the group selection window. To select the 'Map' group, turn the **FMS** Knob and press the **ENT** Key.
4) While the Map Setup Menu is displayed, turn the large **FMS** Knob to highlight and move between 'TERRAIN DATA' and 'OBSTACLE DATA'.
5) Turn the large **FMS** Knob to highlight the zoom range at which terrain and obstacles begin to display on the Navigation Map.
6) Turn the small **FMS** Knob to scroll through the ranges and press the **ENT** Key.

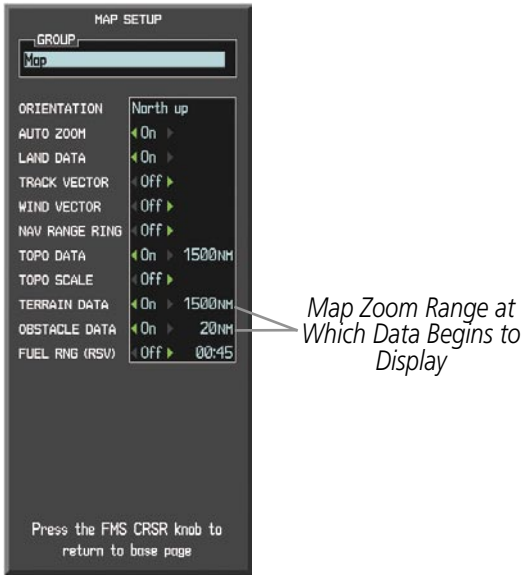


Figure 6-48 Map Setup Window

Refer to Table 6-5 for the altitudes associated with obstacle and terrain colors.

6.4 TAWS

TAWS (Terrain Awareness and Warning System) is an optional feature to increase situational awareness and aid in reducing controlled flight into terrain (CFIT). TAWS satisfies TSO-C151b Class B requirements for certification. Class B TAWS is required for all Part 91 aircraft operations with six or more passenger seats and for Part 135 turbine aircraft operations with six to nine passenger seats (FAR Parts 91.223, 135.154).

TAWS provides visual and aural annunciations when terrain and obstacles are within the given altitude threshold from the aircraft.

REQUIREMENTS

TAWS requires the following to operate properly:

- The system must have a valid 3-D GPS position solution.
- The system must have a valid terrain/obstacle/airport terrain database.

LIMITATIONS

NOTE: *The data contained in the TAWS databases comes from government agencies. Garmin accurately processes and cross-validates the data but cannot guarantee the accuracy and completeness of the data.*

TAWS displays terrain and obstructions relative to the altitude of the aircraft. The displayed alerts and warnings are advisory in nature only. Individual obstructions may be shown if available in the database. However, all obstructions may not be available in the database and data may be inaccurate. Never use this information for navigation or to maneuver to avoid obstacles.

Terrain information is based on terrain elevation information in a database that may contain inaccuracies. Terrain information should be used as an aid to situational awareness. Never use it for navigation or to maneuver to avoid terrain.

TAWS uses terrain and obstacle information supplied by government sources. The data undergoes verification by Garmin to confirm accuracy of the content, per TSO-C151b. However, the displayed information should never be understood as being all-inclusive.

TAWS ALERTING USING GPS POSITION/GPS MSL ALTITUDE

TAWS uses information provided from the GPS receiver to provide a horizontal position and altitude. GPS altitude is derived from satellite measurements. GPS altitude is converted to a mean sea level (MSL)-based altitude (GPS-MSL altitude) and is used to determine TAWS alerts. GPS-MSL altitude accuracy is affected by factors such as satellite geometry, but it is not subject to variations in pressure and temperature that normally affect pressure altitude devices. GPS-MSL altitude does not require local altimeter settings to determine MSL altitude. Therefore, GPS altitude provides a highly accurate and reliable MSL altitude source to calculate terrain and obstacle alerts.

TAWS utilizes terrain and obstacle databases that are referenced to mean sea level (MSL). Using the GPS position and GPS-MSL altitude, TAWS displays a 2-D picture of the surrounding terrain and obstacles relative to the position and altitude of the aircraft. Furthermore, the GPS position and GPS-MSL altitude are used to calculate and "predict" the aircraft's flight path in relation to the surrounding terrain and obstacles. In this

manner, TAWS can provide advanced alerts of predicted dangerous terrain conditions. Detailed alert modes are described later in this section.

BARO-CORRECTED ALTITUDE VERSUS GPS-MSL ALTITUDE

Baro-corrected altitude (or indicated altitude) is derived by adjusting the altimeter setting for local atmospheric conditions. The most accurate baro-corrected altitude can be achieved by frequently updating the altimeter setting to the nearest reporting station along the flight path. However, because actual atmosphere conditions seldom match the standard conditions defined by the International Standard Atmosphere (ISA) model (where pressure, temperature, and lapse rates have fixed values), it is common for the baro-corrected altitude (as read from the altimeter) to differ from the GPS-MSL altitude. This variation results in the aircraft's true altitude differing from the baro-corrected altitude.

USING TAWS

During G1000 power-up, the terrain/obstacle database versions are displayed along with a disclaimer to the pilot. At the same time, TAWS self-test begins. One of the following aural messages is generated:

- ***TAWS System Test OK"***
- ***"TAWS System Failure"***

TAWS information can be displayed on the following pages:

- TAWS Page
- Navigation Map
- PFD Inset Map
- AUX - Trip Planning Page
- Flight Plan Pages (except VNAV)

TAWS can also be displayed on the PFD Inset Map by pressing the **INSET** Softkey, then the **TERRAIN** Softkey. TAWS display may also be deselected from the Inset Map without affecting the display on the MFD maps.

To display TAWS data on any page other than the TAWS Page, press the **MAP** Softkey, then press the **TERRAIN** Softkey. Terrain and obstacles with heights greater than 200 feet above ground level (AGL) are displayed in three color levels (Table 6-7). The G1000 adjusts colors automatically as the aircraft altitude changes.

TAWS PAGE

The TAWS Page is in the MAP group of pages and displays the following:

- GPS-derived MSL altitude in increments of 20 feet or 10 meters, depending on unit configuration
- Aircraft ground track
- Terrain Range - Indicates the terrain elevation in colors relative to the aircraft altitude
- Range marking rings (1 nm, 1 and 2 nm, 2.5 and 5 nm, 5 and 10 nm, 12.5 and 25 nm, 25 and 50 nm, 50 and 100 nm, 100 and 200 nm)
- Heading Box (North Up, Track Up, DTK Up, HDG Up) - Heading on the TAWS Page displays 'HDG Up' map data, unless there is no valid heading
- Obstacles

Displaying the TAWS Page:

1) Select the NAV Page Group.

2) Select the last rectangular page icon.

3) Turn the Joystick clockwise to display a larger area or counter-clockwise to display a smaller area.

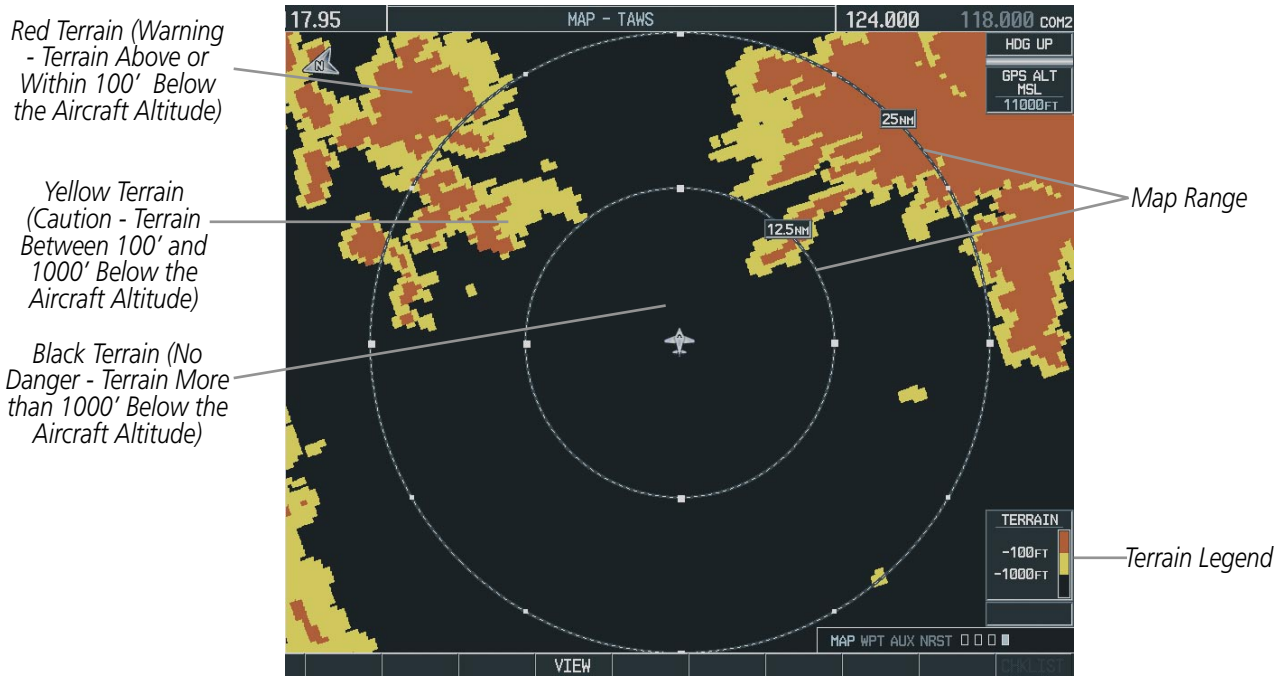


Figure 6-49 TAWS Page (360° View)

The TAWS Page has two view settings:

- 360° View—Displays surrounding terrain on all sides of aircraft (Figure 6-49).
- ARC (120°) View—Displays terrain ahead of and 60° to either side of the aircraft flight path (Figure 6-50).

Changing the viewing mode between 360° and Arc:

1) Select the TAWS Page.
2) Press the **VIEW** Softkey.
3) Press the **360** or **ARC** Softkey to select the desired view.

OR:

1) Press the **MENU** Key. The page menu is displayed with either 'View 120º' or 'View 360º'. Press the **ENT** Key to change the view.
2) Turn the **Joystick** clockwise to display a larger area or counter-clockwise to display a smaller area. Map ranges are 1 nm, 1 and 2 nm, 2.5 and 5 nm, 5 and 10 nm, 12.5 and 25 nm, 25 and 50 nm, 50 and 100 nm, and 100 and 200 nm.

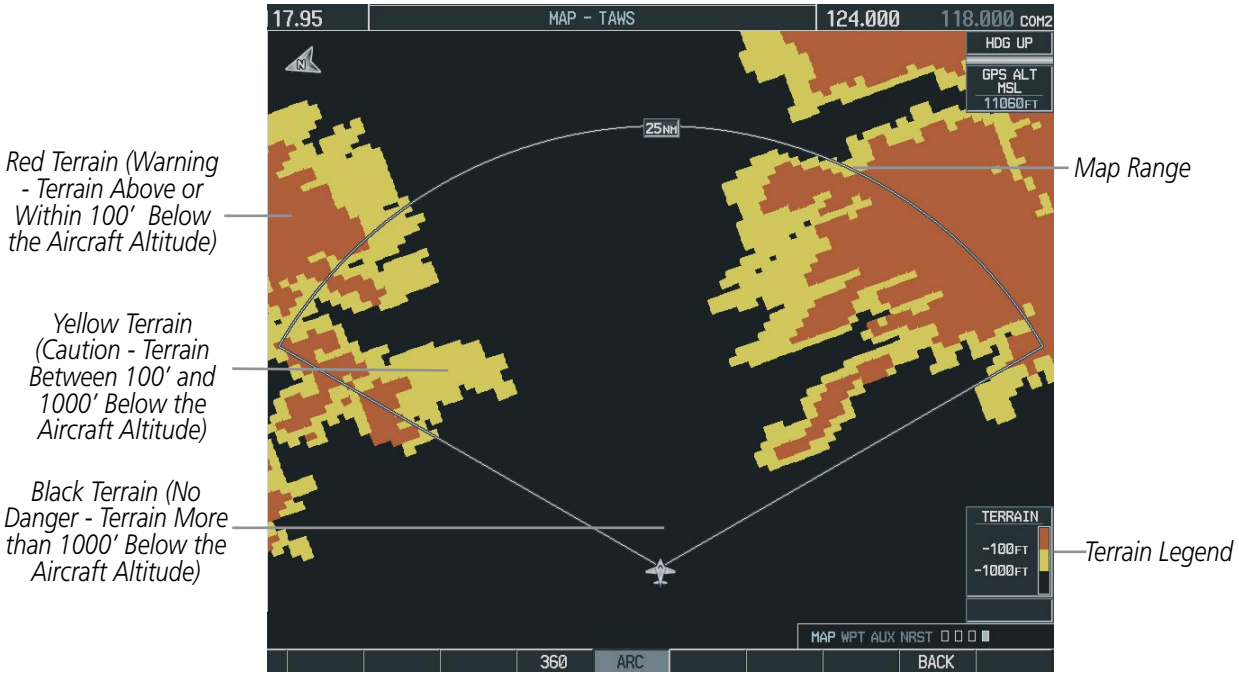


Figure 6-50 TAWS Page (120° View)

Other aviation information such as airports, VORs, and other NAVAIDS can be displayed or hidden on the TAWS Page (Figure 6-51).

Showing or hiding aviation information:

1) Press the **MENU** Key.
2) Select 'Show (or Hide) Aviation Data' and press the **ENT** Key.
3) Press the **CLR** Key to toggle aviation information on or off.

Figure 6-51 TAWS Page Menu

TAWS MANUAL TEST

NOTE: *TAWS System Testing is disabled when ground speed exceeds 30 knots in order not to impede TAWS alerting.*

TAWS provides a manual test which verifies the proper operation of the aural and visual annunciations of the system prior to a flight.

Manually testing the TAWS System:

1) Select the TAWS Page and press the **MENU** Key.
2) Select the 'Test TAWS' option.
3) Press the **ENT** Key to confirm the selection.

One of the following aural messages is generated:

- "***TAWS System Test, OK***"
- "***TAWS System Failure***"

TAWS TEST is annunciated in yellow on the TAWS Page and in white on the PFD.

TAWS SYMBOLS

The symbols and colors in Figure 6-52 and Table 6-7 are used to represent obstacles and potential impact points on the TAWS Page. TAWS uses yellow (caution) and red (warning) to depict terrain information relative to aircraft altitude.

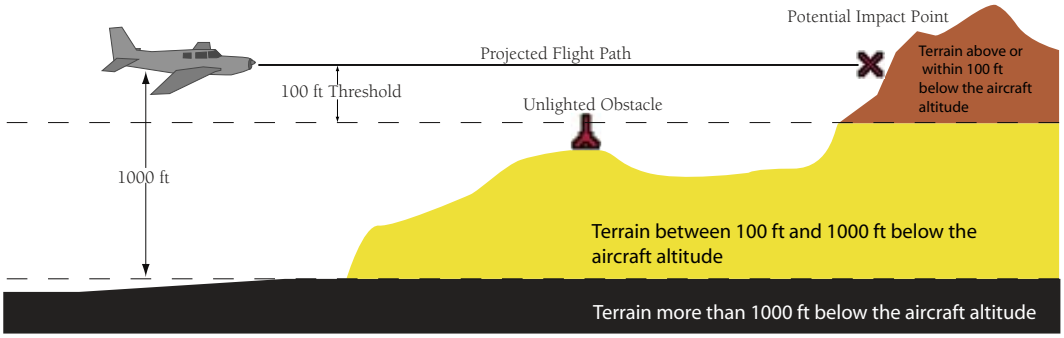

Potential Impact Point
Projected Flight Path
Terrain above or within 100 ft below the aircraft altitude
100 ft Threshold
Unlighted Obstacle
1000 ft
Terrain between 100 ft and 1000 ft below the aircraft altitude
Terrain more than 1000 ft below the aircraft altitude

Figure 6-52 Terrain Altitude/Color Correlation for TAWS

Each color is associated with an alert severity level. Terrain graphics and visual annunciations also use these color assignments.

Obstacle Symbol	Unlighted Obstacle		Lighted Obstacle		Potential Impact Points	Obstacle Location	Alert Level
	< 1000' AGL	> 1000' AGL	< 1000' AGL	> 1000' AGL			
						Obstacle at or within 100' below current aircraft altitude	WARNING
						Obstacle between 100' and 1000' below current aircraft altitude	CAUTION

Table 6-7 TAWS Terrain/Obstacle Colors and Symbology

Note that if an obstacle and the projected flight path of the aircraft intersect, the display automatically zooms in to the closest potential point of impact on the TAWS Page.

TAWS ALERTS

Alerts are issued when flight conditions meet parameters that are set within TAWS software algorithms. TAWS alerts typically employ either a CAUTION or a WARNING alert severity level, or both. When an alert is issued, visual annunciations are displayed. Aural alerts are simultaneously issued.

Annunciations appear in the lower right corner of the MFD display (Figure 6-53).

Figure 6-53 Alert Annunciation on the MFD

Annunciations also appear on the PFD (Figure 6-54).

Figure 6-54 'Pull Up' Annunciation on the PFD

The aural alert voice gender is configurable on the AUX - System Setup Page to be either male or female. Annunciations appear on the PFD and MFD. Pop-up alerts appear only on the MFD.

Figure 6-55 Alert Pop-up

Pop-up terrain alerts (Figure 6-55) can also appear on the MFD during an alert, but **only when the TAWS Page is not displayed**. When an alert displays, the pilot can:

- Press the **CLR** Key. This acknowledges the pop-up alert and returns to the currently viewed page.
- Press the **ENT** Key. This acknowledges the pop-up alert and accesses the TAWS Page.

Table 6-8 shows the possible TAWS alert types with corresponding annunciations and aural messages.

NOTE: *Alerts with multiple messages are configurable at installation and are installation-dependent.*

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Map Page Pop-Up Alert	Aural Message
Excessive Descent Rate Warning (EDR)	PULL UP	PULL-UP	"Pull Up"
Reduced Required Terrain Clearance Warning (RTC)	PULL UP	TERRAIN - PULL-UP * or TERRAIN AHEAD - PULL-UP	"Terrain, Terrain; Pull Up, Pull Up" * or "Terrain Ahead, Pull Up; Terrain Ahead, Pull Up"
Imminent Terrain Impact Warning (ITI)	PULL UP	TERRAIN AHEAD - PULL-UP * or TERRAIN - PULL-UP	Terrain Ahead, Pull Up; Terrain Ahead, Pull Up' * or "Terrain, Terrain; Pull Up, Pull Up"
Reduced Required Obstacle Clearance Warning (ROC)	PULL UP	OBSTACLE - PULL-UP * or OBSTACLE AHEAD - PULL-UP	"Obstacle, Obstacle; Pull Up, Pull Up" * or "Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up"
Imminent Obstacle Impact Warning (IOI)	PULL UP	OBSTACLE AHEAD - PULL-UP * or OBSTACLE - PULL-UP	"Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up" * or "Obstacle, Obstacle; Pull Up, Pull Up"
Reduced Required Terrain Clearance Caution (RTC)	TERRAIN	CAUTION - TERRAIN * or TERRAIN AHEAD	"Caution, Terrain; Caution, Terrain" * or "Terrain Ahead; Terrain Ahead"
Imminent Terrain Impact Caution (ITI)	TERRAIN	TERRAIN AHEAD * or CAUTION - TERRAIN	"Terrain Ahead; Terrain Ahead" * or "Caution, Terrain; Caution, Terrain"
Reduced Required Obstacle Clearance Caution (ROC)	TERRAIN	CAUTION - OBSTACLE * or OBSTACLE AHEAD	"Caution, Obstacle; Caution, Obstacle" * or "Obstacle Ahead; Obstacle Ahead"
Imminent Obstacle Impact Caution (IOI)	TERRAIN	OBSTACLE AHEAD * or CAUTION - OBSTACLE	"Obstacle Ahead; Obstacle Ahead" * or "Caution, Obstacle; Caution, Obstacle"
Premature Descent Alert Caution (PDA)	TERRAIN	TOO LOW - TERRAIN	"Too Low, Terrain"
Altitude Callout "500"	None	None	"Five-Hundred"
Excessive Descent Rate Caution (EDR)	TERRAIN	SINK RATE	"Sink Rate"
Negative Climb Rate Caution (NCR)	TERRAIN	DON'T SINK * or TOO LOW - TERRAIN	"Don't Sink" * or "Too Low, Terrain"

* Indicates the default configuration

Table 6-8 TAWS Alerts Summary

Table 6-9 shows system status annunciations that may also be issued:

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Pop-Up Alert	Aural Message
TAWS System Test Fail	TAWS FAIL	None	"TAWS System Failure"
TAWS Alerting is disabled	TAWS INHB	None	None
No GPS position or excessively degraded GPS signal	TAWS N/A	None	"TAWS Not Available" "TAWS Available" is generated when sufficient GPS signal is re-established.
System Test in progress	TAWS TEST	None	None
System Test pass	None	None	"TAWS System Test OK"

Table 6-9 Additional System Annunciations

FORWARD LOOKING TERRAIN AVOIDANCE

The Forward Looking Terrain Avoidance (FLTA) alert is used by TAWS and is composed of:

• Reduced Required Terrain Clearance and Reduced Required Obstacle Clearance

Reduced Required Terrain Clearance (RTC) and Reduced Required Obstacle Clearance (ROC) alerts are issued when the aircraft flight path is above terrain, yet is projected to come within the minimum clearance values in Table 6-10. When an RTC alert is issued, a potential impact point is displayed on the TAWS Page.

• Imminent Terrain Impact and Imminent Obstacle Impact

Imminent Terrain Impact (ITI) and Imminent Obstacle Impact (IOI) alerts are issued when the aircraft is below the elevation of a terrain or obstacle cell in the aircraft's projected path. ITI and IOI alerts are accompanied by a potential impact point displayed on the TAWS Page. The alert is annunciated when the projected vertical flight path is calculated to come within minimum clearance altitudes in Table 6-10.

Phase of Flight	Minimum Clearance Altitude Level Flight (ft)	Minimum Clearance Altitude Descending (ft)
Enroute	700	500
Terminal	350	300
Approach	150	100
Departure	100	100

Table 6-10 Minimum Terrain and Obstacle Clearance Values for FLTA Alerts

During the final approach phase of flight, FLTA alerts are automatically inhibited when the aircraft is below 200 feet AGL while within 0.5 nm of the approach runway or below 125 feet AGL while within 1.0 nm of the runway threshold.

PREMATURE DESCENT ALERTING

A Premature Descent Alert (PDA) is issued when the system detects that the aircraft is significantly below the normal approach path to a runway (Figure 6-56).

PDA alerting begins when the aircraft is within 15 nm of the destination airport. PDA alerting ends when the aircraft is either:

- 0.5 nm from the runway threshold

OR

- at or below an altitude of 125 feet AGL while within 1.0 nm of the threshold.

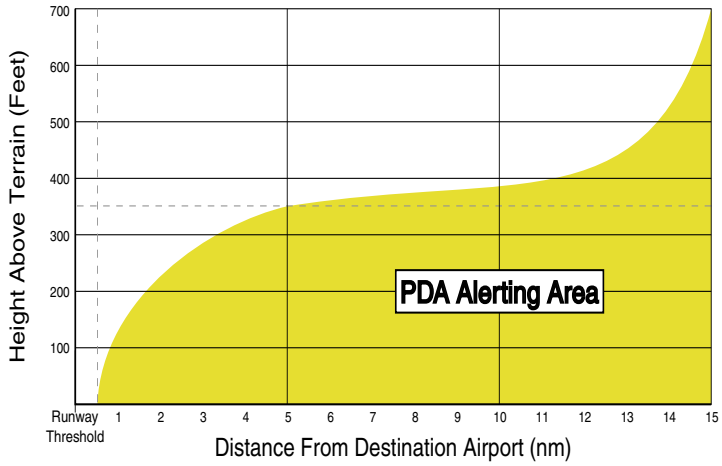


Figure 6-56 PDA Alerting Threshold

TAWS INHIBIT

TAWS also has an inhibit mode that deactivates the PDA/FLTA aural and visual alerts. Pilots should use discretion when inhibiting TAWS and always remember to enable the system when appropriate. Only the PDA and FLTA alerts are disabled in the inhibit mode. For more information, see the section on TAWS alerts.

Inhibiting and enabling TAWS:

1) Select the TAWS Page.
2) Press the **MENU** Key. 'Inhibit TAWS' or 'Enable TAWS' is highlighted.
3) Press the **ENT** Key. The TAWS system is inhibited or enabled, depending on the previous status. The annunciation is displayed in the terrain annunciator field whenever terrain is inhibited.

EXCESSIVE DESCENT RATE ALERT

The purpose of the Excessive Descent Rate (EDR) alert is to provide suitable notification when the aircraft is determined to be closing (descending) upon terrain at an excessive speed. Figure 6-57 shows the parameters for the alert as defined by TSO-C151b.

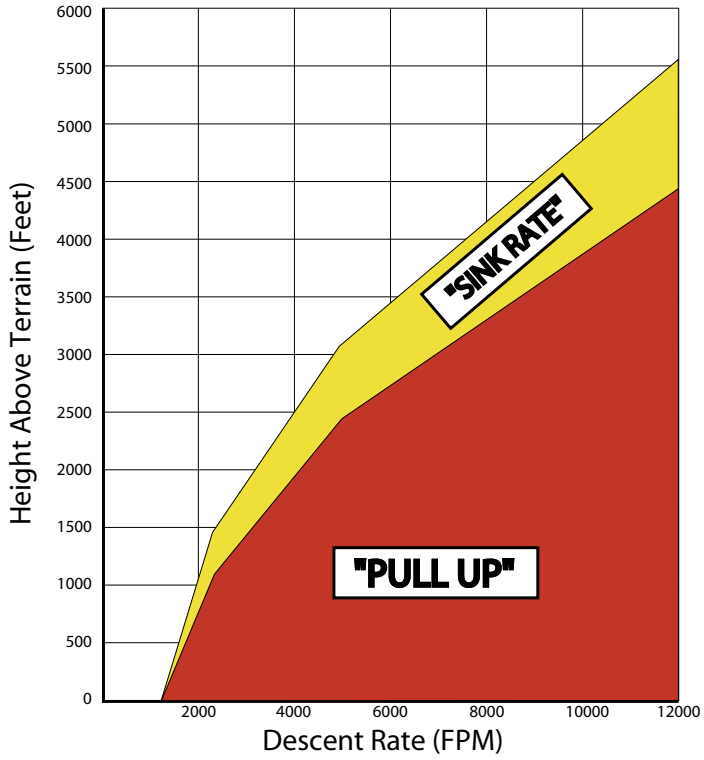


Figure 6-57 Excessive Descent Rate Alert Criteria

NEGATIVE CLIMB RATE AFTER TAKEOFF ALERT (NCR)

The purpose of the Negative Climb Rate (NCR) After Takeoff alert (also referred to as "Altitude Loss After Takeoff") is to provide suitable alerts to the pilot when the system determines that the aircraft is losing altitude (closing upon terrain) after takeoff. The aural message "Don't Sink" is given for NCR alerts, accompanied by an annunciation and a pop-up terrain alert on the display. NCR alerting is only active when departing from an airport and when the following conditions are met:

- The height above the terrain is less than 700 feet.
- The distance from the departure airport is 2 nm or less.
- The heading change from the heading at the time of departure is less than 110 degrees.

Figure 6-58 shows the NCR alerting parameters as defined by TSO-C151b.

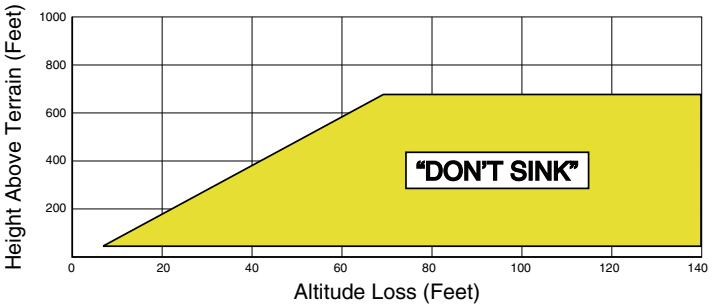


Figure 6-58 Negative Climb Rate (NCR) Alert Criteria

FIVE-HUNDRED AURAL ALERT

The purpose of the aural alert message "Five-hundred" is to provide an advisory alert to the pilot that the aircraft is 500 feet above terrain. When the aircraft descends within 500 feet of terrain, the aural message "five-hundred" is generated. There are no display annunciations or pop-up alerts that accompany the aural message.

TAWS NOT AVAILABLE ALERT

TAWS requires a 3-D GPS navigation solution along with specific vertical accuracy minimums. Should the navigation solution become degraded or if the aircraft is out of the database coverage area, the annunciation 'TAWS N/A' is generated in the annunciation window and on the TAWS Page. The aural message "TAWS Not Available" is generated. When the GPS signal is re-established and the aircraft is within the database coverage area, the aural message "TAWS Available" is generated.

TAWS FAILURE ALERT

TAWS continually monitors several system-critical items such as database validity, hardware status, and GPS status. If the terrain/obstacle database is not available, the aural message "TAWS System Failure" is generated along with a 'TAWS FAIL' annunciation.

6.5 TRAFFIC INFORMATION SERVICE (TIS)

Warning: *The Traffic Information Service (TIS) is intended for advisory use only. TIS is intended to help the pilot locate traffic visually. It is the responsibility of the pilot to see and maneuver to avoid traffic.*

NOTE: *TIS is available only when the aircraft is within the service volume of a TIS-capable terminal radar site. Aircraft without an operating transponder are invisible to both Traffic Advisory Systems (TAS) and TIS. Aircraft without altitude reporting capability are shown without altitude separation data or climb descent indication.*

NOTE: *TIS is disabled when Traffic Advisory System (TAS) is installed.*

TIS SYMBOLOGY

Traffic Information Service (TIS) is designed to help pilots detect and avoid aircraft intersecting their flight path. TIS uses the Mode S transponder for the traffic data link.

TIS receives traffic information from ground stations and provides a five-second update rate. The G1000 displays up to eight traffic targets within a 7.5 nm radius, from 3000 feet below to 3500 feet above the requesting aircraft. Traffic is displayed according to TCAS symbology using four different symbols (Table 6-11).

TIS Symbol	Description
	Non-Threat Traffic
	Proximity Advisory (PA)
	Traffic Advisory (TA)
	Traffic Advisory Off Scale

Table 6-11 TIS Symbol Descriptions

Proximity Advisories (PAs) are defined as traffic within the 5.0-nm range, within ±1200 feet of altitude separation. They are not Traffic Advisories (TA), which alert the crew to intruding aircraft. When traffic meets the advisory criteria for the TA, a solid yellow circle symbol is generated. TIS provides vector lines showing the direction in which the aircraft symbol is moving, to the nearest 45°.

Deviation from aircraft altitude is displayed above or below the target symbol, depending on the traffic location. Altitude trend is displayed as an up (+500 ft/min) or down (-500 ft/min) arrow to the right of the target symbol. If the altitude trend is less than 500 ft/min rate in either direction, no arrow displays.

The Traffic Map Page is in the MAP Group and displays the following information:

- Current aircraft location
- Surrounding Traffic Information Service (TIS) traffic
- Range marking rings
- Current traffic mode
  - OPERATE
  - STANDBY
- Traffic alert messages
  - FAILED
  - DATA FAILED
  - NO DATA
  - UNAVAILABLE
- Traffic display banner of all possible system statuses
  - AGE MM:SS
  - TRFC COAST
  - TA OFF SCALE
  - TRFC RMVD
  - TRFC FAIL
  - NO TRFC DATA
  - TRFC UNAVAIL
  - TRAFFIC

If data is not received for a period longer than six seconds, the age of the present data will be displayed in the lower left of the screen along with the annunciation that the system has entered Coast mode. The system will maintain the traffic display (up to 60 seconds) until the next data reception. If no data is received after 60 seconds, traffic will be removed from the display.

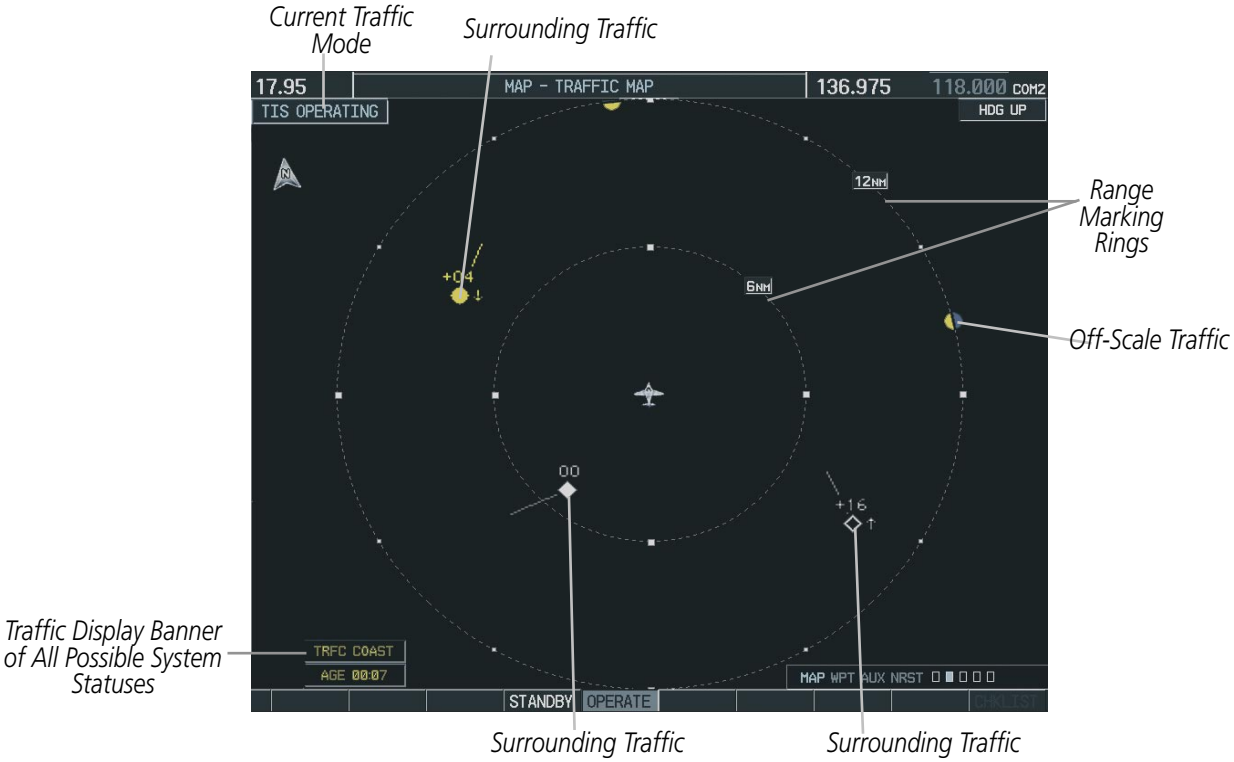


Figure 6-59 Traffic Map Page

Displaying traffic on the Traffic Map Page:

1) Select the Map Page Group.

2) Select the Traffic Map Page.

3) Press the **OPERATE** Softkey to begin displaying traffic. 'TIS OPERATING' is displayed in the upper left corner of the page. Alternatively, press the **STANDBY** Softkey to place the system in the Standby mode. 'TIS STANDBY' displays in the upper left corner of the page.

4) Turn the **Joystick** clockwise to display a larger area or counter-clockwise to display a smaller area

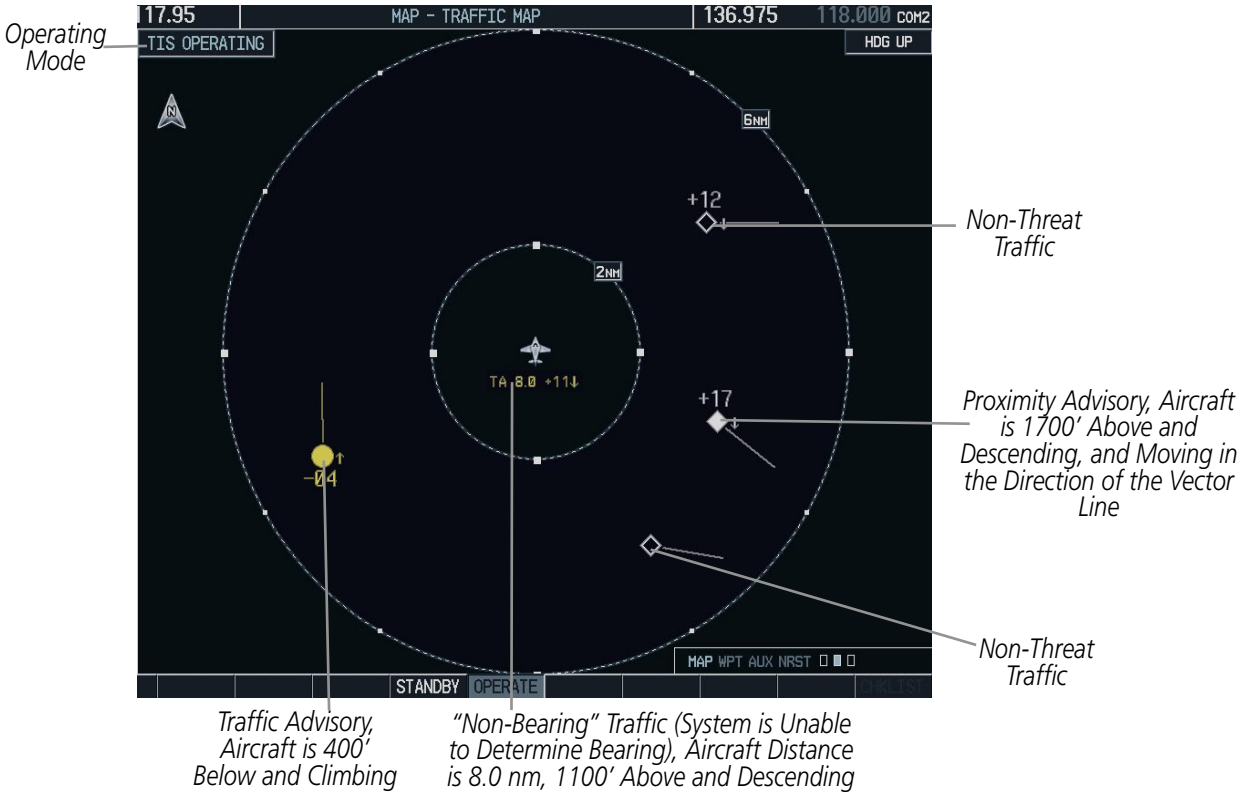


Figure 6-60 Traffic Map Page - Advisories

Traffic information can be displayed on the following other pages by pressing the **MAP** Softkey, followed by the **TRAFFIC** Softkey:

- Navigation Map
- WPT - VOR Information Page
- PFD Inset Map
- AUX - Trip Planning Page
- Nearest Pages
- FPL - Active Flight Plan Page

TIS POWER-UP TEST

The TIS system performs an automatic test during power-up. If the system passes the power-up test, the standby screen is displayed on the Traffic Map Page. If the aircraft is airborne during the test, traffic is displayed on the Traffic Page.

If the system fails the power up test, one of the following messages displays:

- NO DATA - Indicates that data is not being received from the transponder.
- DATA FAILED - Indicates that data is being received from the transponder, but a failure was detected in the data stream.
- FAILED - Indicates that the transponder has failed.

Contact the service center or Garmin dealer for corrective action for these messages.

To change the map range, turn the **Joystick** clockwise to zoom out or counter-clockwise to zoom in. Map ranges are 2 nm, 6 nm, and 12 nm.

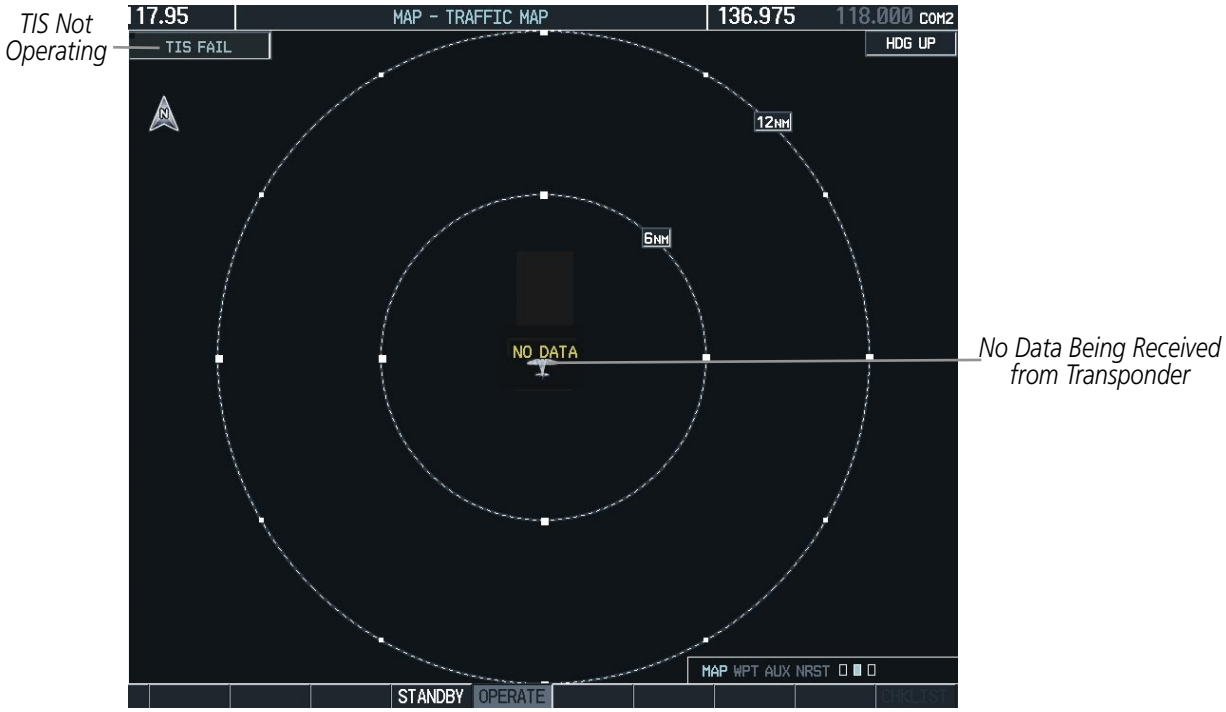


Figure 6-61 Traffic Map Page Power-up Test

OPERATING MODES

Once the aircraft is airborne, the system switches from Standby mode to Operating mode. The G1000 displays 'TIS OPERATING' in the upper left-hand corner and begins to display traffic on the Traffic Map Page. The TIS Traffic Advisory (TA) alerts the crew to intruding aircraft.

Once the aircraft is on the ground the system switches from operating mode to standby mode. The Traffic Map Page displays 'STANDBY'. The pilot can use the page menu or softkeys to switch between Standby (STBY) and Operating (ON) modes and manually override automatic operation.

Switching between operating modes:

1) Select the Map Page Group.
2) Select the Traffic Map Page.
3) Press the **STANDBY** or **OPERATE** Softkey to switch between modes. 'TIS STANDBY' or 'TIS OPERATING' is displayed in the status box in the upper left corner of the Traffic Map Page.

OR:

1) Press the **MENU** Key. The page menu displays 'Standby Mode' or 'Operate Mode'.
2) Press the **ENT** Key on the desired selection.

AUDIO ALERTS

An audio alert is generated whenever the number of TAs on the Traffic Map Page increases from one scan to the next. This reduces the amount of nuisance alerts due to proximate aircraft. For example, when the first TA is displayed, an aural alert is generated. As long as a single TA aircraft remains on the display, no additional alerts are generated. If a second TA aircraft appears on the display, a new audio alert is generated. If the number of TAs initially decreases and then subsequently increases, another audio alert is generated.

An audio alert is also generated when the TIS service becomes unavailable. The volume of the audio alert is configured during installation.

The following alerts are available:

- Traffic - Traffic alert is received.
- Traffic Not Available - TIS is not available or out of range.

TIS TRAFFIC STATUS

The MFD indicates traffic status in the Traffic Banner in the lower left corner of the map. The statuses in the following list are a subset of all possible system statuses and only include traffic information.

- AGE - If traffic data is not refreshed within six seconds, an age indicator ('AGE MM:SS') displays in the lower left corner. If data is not received after another six seconds, the traffic is removed from the display. The quality of displayed traffic information is reduced as the AGE increases.
- TRFC COAST - Indicates that the displayed data is not current. The quality of displayed traffic information is reduced when TRFC COAST displays.
- TRFC RMVD - Indicates that traffic has been removed because it is too old to "coast" (older than 12-60 seconds from the last receipt of a message). There may be traffic, but it is not displayed.
- TA OFF SCALE - Indicates that a traffic advisory is outside the selected display range. The off range banner is removed when the traffic comes within the selected display range.

6.6 L-3 SKYWATCH (SKY497)

NOTE: *SKYWATCH Traffic Advisory System (TAS) takes priority over TIS services. If SKYWATCH is installed, no TIS data is displayed.*

USER-INITIATED TEST

SKYWATCH performs an initial self-test at power-up. In addition, it performs a continuous self-test several times per minute. Refer to the L-3 Skywatch Pilot's Guide for a detailed discussion of the SKY497 TAS System.

Performing a user-initiated test:

1) With SKYWATCH in 'Standby' or 'Failed' mode, press the **TEST** Softkey.
2) If SKYWATCH successfully completes the test, the aural message "Traffic Alert System Test Passed" is generated. SKYWATCH transitions to **OPERATE** mode.
3) If a failure is detected during the test, the aural message "Traffic Alert System Test Failed" is generated. The unit reverts to STANDBY mode.
4) If the test fails, press the **TEST** Softkey again.
5) If the self-test fails again, refer to the L-3 Skywatch Pilot's Guide.

Figure 6-62 shows the Traffic Map symbols that display when a user-initiated test is completed successfully:

Figure 6-62 User-Initiated Test Results

SKYWATCH TAS SYMBOLOGY

SKYWATCH uses the following Traffic Map symbols (Table 6-12):

TIS Symbol	Description
	Non-Threat Traffic
	Proximity Advisory (PA)
	Traffic Advisory (TA)
	Traffic Advisory Off Scale

Table 6-12 TAS Symbol Descriptions

SWITCHING FROM STANDBY MODE

The unit must be in operating mode for traffic to be displayed. The ability to switch out of standby into operating mode on the ground is especially useful for scanning the airspace around the airport before takeoff.

Switching to operating mode from standby mode:

1) On the Traffic Page, press the **OPERATE** Softkey.

OR:

1) Press the **MENU** Key.
2) Turn the small **FMS** Knob to select 'Operating Mode'.
3) If 'Operating Mode' is selected from the FMS menu, press the **ENT** Key to confirm and place SKYWATCH in operating mode.
4) To switch to Standby Mode from the Traffic Page, press the **STANDBY** Softkey.

ALTITUDE DISPLAY MODE

Changing the altitude display mode:

1) On the Traffic Page, press the **ALT MODE** Softkey.
2) Press one of the following softkeys:
   - BELOW
   - NORMAL
   - ABOVE
   - UNREST
3) Press the **BACK** Softkey to return to the main Traffic Page.

OR:

1) Press the **MENU** Key.
2) Turn the small **FMS** Knob to select one of the following:
   - BELOW
   - NORMAL
   - ABOVE
   - UNRESTRICTED
3) Press the **ENT** Softkey.

Displaying traffic on the Traffic Map Page:

1) Select the Map Page Group.
2) Select the second rectangular page icon.
3) Press the **OPERATE** Softkey to begin displaying traffic. 'TAS OPERATING' is displayed in the upper left corner of the page.
4) Press the **ALT MODE** Softkey to change the altitude volume.
5) Select the desired altitude volume by pressing the **BELOW**, **NORMAL**, **ABOVE**, or **UNREST** (unrestricted) Softkey. The selection is displayed in the Altitude mode field in the upper left.
6) Press the **STANDBY** Softkey to place the system in the Standby mode. 'TAS STANDBY' displays in the upper left corner of the page.
7) Turn the **Joystick** clockwise to display a larger area or counter-clockwise to display a smaller area.

TRAFFIC MAP PAGE DISPLAY RANGE

The display range on the Traffic Map Page can be changed at any time.

Changing the display range on the Traffic Map Page:

1) Turn the **RANGE** Knob.
2) The following range options are available:
   - 2 nm
   - 2 and 6 nm
   - 6 and 12 nm
   - 12 and 24 nm
   - 24 and 40 nm

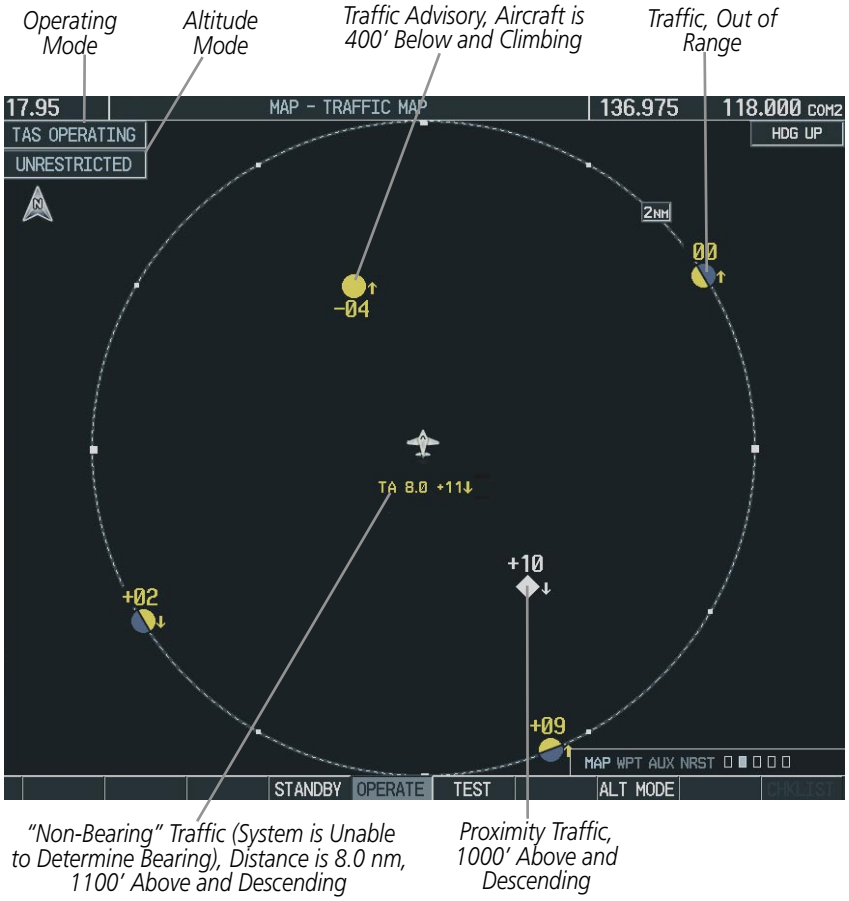


Figure 6-63 Traffic Map Page

NOTE: *SKYWATCH altitude display range is indicated in hundreds of feet relative to the aircraft. In Figure 6-63, SKYWATCH indicates that the non-bearing intruder aircraft is at 1100 feet above the aircraft and descending.*

Displaying traffic on the Navigation Map:

1) Ensure that SKYWATCH is operating.

2) With the Navigation Map displayed, press the **MAP** Softkey.

3) Press the **TRAFFIC** Softkey. Traffic displays on the Navigation Map (Figures 6-64).

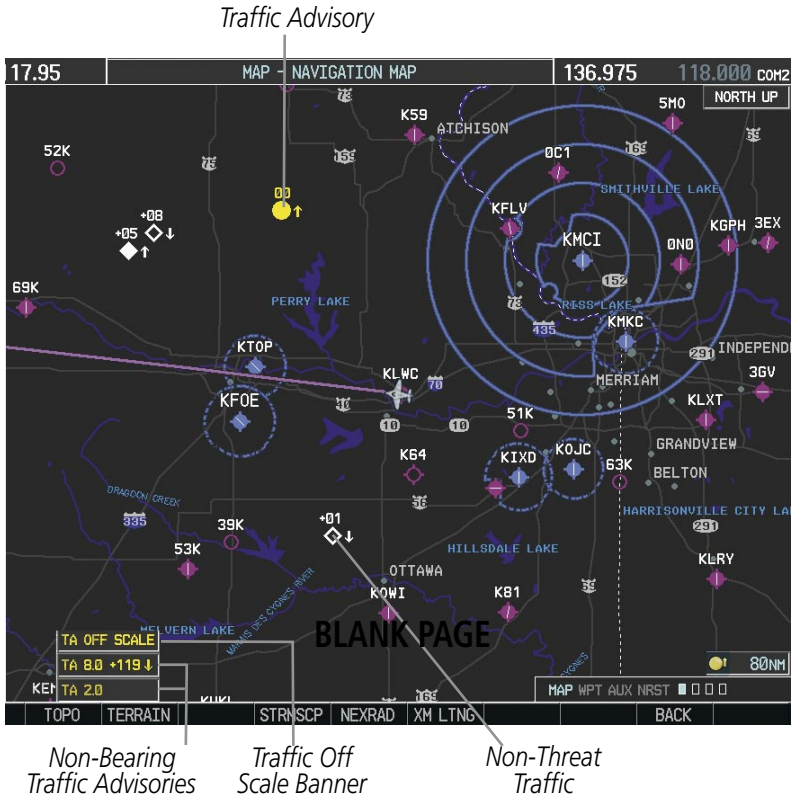


Figure 6-64 TAS Traffic on Navigation Map

SECTION 7 AUTOMATIC FLIGHT CONTROL SYSTEM

7.1 AFCS OVERVIEW

NOTE: *The approved Aircraft Flight Manual Supplement (AFMS) always supersedes the information in this guide.*

NOTE: *A failure of the primary (#1) GIA 63 Integrated Avionics Unit (IAU) results in loss of the flight director. Any IAU failure results in loss of the autopilot and manual electric trim.*

The GFC 700 is a digital Automatic Flight Control System (AFCS), fully integrated within the G1000 System avionics architecture. Refer to Figure 1-1 in the System Overview for a block diagram supporting this system description. GFC 700 AFCS functionality in the Beechcraft A36/G36 is distributed across the following Line Replaceable Units (LRUs):

- GDU 1040 Primary Flight Display (PFD)
- GDU 1043 Multi-Function Display (MFD)
- GIA 63 Integrated Avionics Units (IAU) - 2
- GSA 81 AFCS Servos - 4
- GSM 85 Servo Mounts - 4

The GFC 700 AFCS performs these main operating functions:

- **Flight Director (FD)** — Flight director operation takes place within the primary (#1) IAU. Flight director commands are displayed on the PFD. The flight director provides:
  - Command Bars showing pitch/roll guidance
  - Pitch/roll mode selection and processing
  - Autopilot communication
- **Autopilot (AP)** — Autopilot operation occurs within the pitch, pitch trim, and roll servos and provides servo monitoring and automatic flight control in response to flight director steering commands, AHRS attitude and rate information, and airspeed.
- **Yaw Damper (YD**) — The yaw servo is self-monitoring and provides Dutch roll damping and turn coordination in response to yaw rate, roll angle, vertical acceleration, and airspeed.
- **Manual Electric Trim (MET)** — The pitch trim servo provides manual electric trim capability when the autopilot is not engaged.

AFCS CONTROLS ON THE MFD

The following dedicated AFCS keys are located on the bezel of the MFD:

1	**AP Key**	Engages/disengages the autopilot
2	**FD Key**	Activates/deactivates the flight director only Pressing once turns on the flight director in the default pitch and roll modes. Pressing again deactivates the flight director and removes the Command Bars. If the autopilot is engaged, the key is disabled.
3	**NAV Key**	Selects/deselects Navigation Mode
4	**ALT Key**	Selects/deselects Altitude Hold Mode
5	**VS Key**	Selects/deselects Vertical Speed Mode
6	**YD Key**	Engages/disengages the yaw damper
7	**FLC Key**	Selects/deselects Flight Level Change Mode
8	**HDG Key**	Selects/deselects Heading Select Mode
9	**APR Key**	Selects/deselects Approach Mode
10	**NOSE UP/NOSE DN Keys**	Control the active mode reference in Pitch Hold, Vertical Speed, and Flight Level Change modes

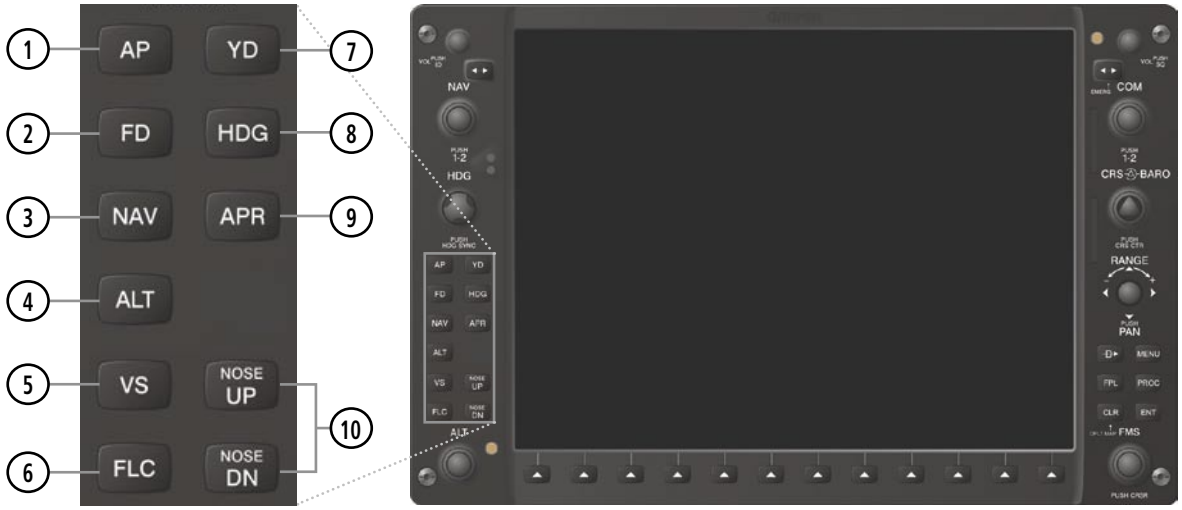


Figure 7-1 Dedicated MFD AFCS Controls

ADDITIONAL AFCS CONTROLS

The following AFCS controls are located in the cockpit separately from the MFD:

AP DISC Switch (Autopilot Disconnect)

Disengages the autopilot and yaw damper and interrupts pitch trim operation

The **AP DISC** Switch is red and located forward of the **MET** switch on the pilot's control wheel left grip.

This switch may be used to acknowledge an autopilot disconnect and mute the associated aural tone.

CWS Button (Control Wheel Steering)

Momentarily disengages the autopilot and synchronizes the flight director's Command Bars with the current aircraft pitch (if not in Glideslope Mode) and roll (if in Roll Hold Mode)

The **CWS** Button is located on top of the right grip of the pilot's control wheel.

Upon release of the **CWS** Button, the flight director may establish new reference points, depending on the currently active pitch and roll modes. CWS operation details are discussed under mode descriptions in this section.

GA Button (Go Around)

Disengages the autopilot and selects flight director Go Around Mode

The **GA** Button is located on the throttle handle.

MET Switch (Manual Electric Trim)

Used to command manual electric pitch trim

The **MET** Switch is located on the left grip of the pilot's control wheel.

This composite switch is split into left and right sides. The left switch is the ARM contact and the right switch controls the DN (forward) and UP (rearward) contacts. The **MET** ARM switch can be used to disengage the autopilot and to acknowledge an autopilot disconnect alert and mute the associated aural tone.

Manual trim commands are generated only when both sides of the switch are operated simultaneously. If either side of the switch is active separately for more than 3 seconds, MET function is disabled and 'PTRM' is displayed as the AFCS Status Annunciation on the PFD. The function remains disabled until both sides of the switch are inactivated.

7.2 FLIGHT DIRECTOR OPERATION

The flight director function provides pitch and roll commands to the AFCS and displays them on the PFD. With the flight director activated, the aircraft can be hand-flown to follow the path shown by the Command Bars. Maximum commanded pitch (+20°/-15°) and bank (22°) angles, vertical acceleration, and roll rate are limited to values established during AFCS certification. The flight director also provides commands to the autopilot.

ACTIVATING THE FLIGHT DIRECTOR

Pressing the **FD** or **AP** Key (when the flight director is not active) activates the flight director in default pitch/roll modes. Pushing the **GA** Button or any fight director mode key activates the flight director in the respective mode(s). The flight director may be turned off by pressing the **FD** Key. The **FD** Key is disabled when the autopilot is engaged.

COMMAND BARS

Upon activation of the flight director, Command Bars are displayed on the PFD as a single cue. The Command Bars move together vertically to indicate pitch commands, and bank left or right to indicate roll commands. If the attitude information sent to the flight director becomes invalid or unavailable, the Command Bars are removed from the display. The Command Bars do not override the aircraft symbol.

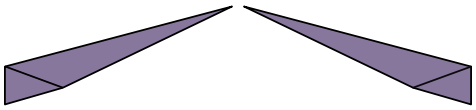
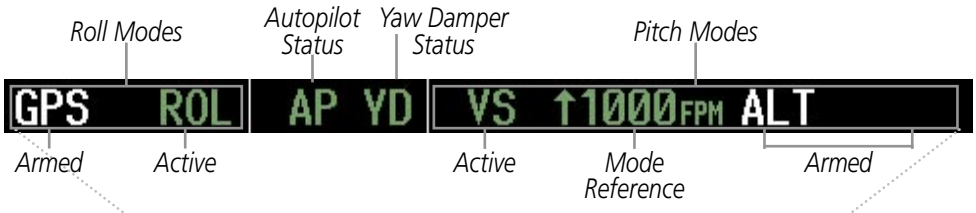


Figure 7-2 Command Bars

AFCS STATUS BOX

Flight director mode annunciations are displayed on the PFD when the flight director is active. Flight director roll modes are shown on the left and pitch on the right. Armed modes are annunciated in white and active in green. Autopilot status is displayed in the center of the AFCS Status Box.



AFCS Status Box

Figure 7-3 PFD AFCS Display

7.3 FLIGHT DIRECTOR MODES

Flight director modes are normally selected independently for the pitch and roll axes. Unless otherwise specified, all mode keys are alternate action (i.e., press on, press off). In the absence of specific mode selection, the flight director reverts to the default pitch and/or roll modes(s).

Armed modes are annunciated in white and active in green in the AFCS Status Box. Under normal operation, when the control for the active flight director mode is pressed, the flight director reverts to the default mode(s) for the axis(es). Automatic transition from armed to active mode is indicated by the white armed mode annunciation moving to the green active mode field and flashing for 10 seconds.

If the information required to compute a flight director mode becomes invalid or unavailable, the flight director automatically reverts to the default mode for that axis. A flashing yellow mode annunciation indicates either the loss of sensor (AHRS, ADC, IAU) or navigation data (VOR, LOC, GPS) required to compute commands. When such a loss occurs, the system automatically begins to roll the wings level or maintain the pitch angle, depending on the affected axis. The flashing annunciation stops when the affected mode key is pressed or another mode for the axis is selected. After 10 seconds, if no action is taken, the flashing annunciation stops.

Figure 7-4 Loss of VOR Signal

The flight director is automatically disabled if the attitude information required to compute the default flight director modes becomes invalid or unavailable.

PITCH MODES

The GFC 700 AFCS offers the following pitch modes:

- **Pitch Hold** (default mode) – Holds the current aircraft pitch attitude; may be used to climb/descend to the Selected Altitude
- **Altitude Hold** – Holds the current Altitude Reference
- **Vertical Speed** – Maintains the current aircraft vertical speed; may be used to climb/descend to the Selected Altitude
- **Flight Level Change** – Maintains the current aircraft airspeed while the aircraft is climbing/descending to the Selected Altitude
- **Glideslope** – Intercepts and tracks the ILS glideslope on approach
- **Go Around** – Automatically disengages the autopilot and commands a constant pitch angle and wings level

The following table lists each pitch mode with the corresponding control and annunciation. The mode reference is displayed next to the active mode annunciation for Altitude Hold, Vertical Speed, and Flight Level Change modes. The **NOSE UP/NOSE DN** keys may be used to change the pitch mode reference while operating under Pitch Hold, Vertical Speed, or Flight Level Change Mode. Increments of change for each mode using the **NOSE UP/NOSE DN** keys are listed next to the mode annunciation in the table:

Pitch Mode	Control	Annunciation	Reference Range	Reference Change Increment
Pitch Hold	(default)	PIT	-15° to +20°	0.5°
Altitude Hold	**ALT** Key	ALT nnnnn FT		
Vertical Speed	**VS** Key	VS nnnn FPM	-3000 to +1500 fpm	100 fpm
Flight Level Change	**FLC** Key	FLC nnn KT	80 to 190 kt	1 kt
Glideslope Arm/Capture/Track	**APR** Key	GS		
Go Around	**GA** Button	GA		

Table 7-1 Pitch Modes

PITCH HOLD MODE (PIT)

When the flight director is activated (the **FD** Key is pressed), Pitch Hold Mode is selected by default. Pitch Hold Mode is indicated as the active pitch mode by the green annunciation 'PIT'. This mode may be used for climb or descent to the Selected Altitude (shown above the Altimeter), since Altitude Hold Mode is automatically armed when the mode is activated.

In Pitch Hold Mode, the flight director maintains a constant pitch attitude, the pitch reference. The pitch reference is set to the aircraft attitude at the moment of mode selection. If the aircraft pitch attitude exceeds the flight director pitch command limitations, the flight director commands a pitch angle equal to the nose-up/down limit.

Changing the Pitch Reference

When operating in Pitch Hold Mode, the pitch reference can be adjusted by:

- Using the **NOSE UP/NOSE DN** keys
- Pressing the **CWS** Button, hand-flying the aircraft to establish a new pitch reference, then releasing the **CWS** Button

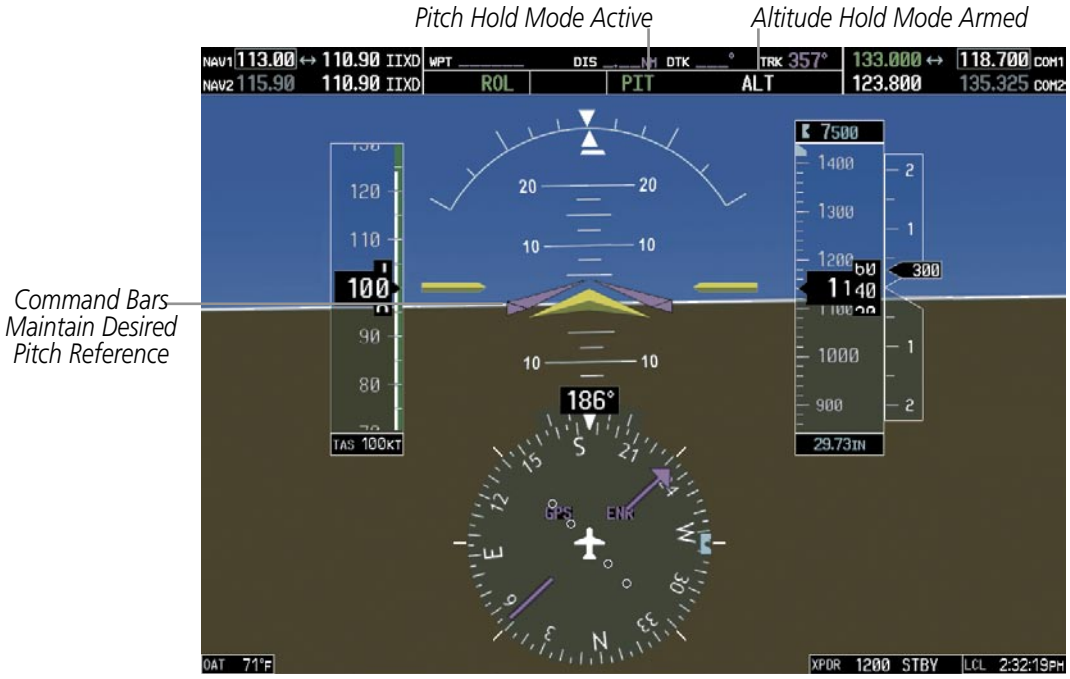


Figure 7-5 Pitch Hold Mode

ALTITUDE HOLD MODE (ALT)

Altitude Hold Mode can be activated by pressing the **ALT** Key; the flight director maintains the current aircraft altitude (to the nearest ten feet) as the Altitude Reference). The flight director's Altitude Reference is shown in the AFCS Status Box and is independent of the Selected Altitude, displayed above the Altimeter. Altitude Hold Mode active is indicated by a green 'ALT' annunciation in the AFCS Status Box.

Altitude Hold Mode is armed automatically when the flight director is in Pitch Hold, Vertical Speed, Flight Level Change, or Go Around Mode. This armed mode is indicated by a white 'ALT' annunciation in the AFCS Status Box. When armed, the flight director commands a constant acceleration maneuver to capture and level off at the Selected Altitude. When the flight director starts the altitude capture, it transitions to Altitude Hold Mode and holds the Selected Altitude; in this case, the Altitude Reference corresponds to the Selected Altitude. The white 'ALT' annunciation moves to the active pitch mode field and flashes green for up to 10 seconds to indicate transition to Altitude Hold Mode.

Changing the Altitude Reference

NOTE: *Turning the **ALT** Knob while in Altitude Hold Mode changes the Selected Altitude, but not the flight director's Altitude Reference and does not cancel the mode.*

With the **CWS** Button depressed, the aircraft can be hand-flown to a new Altitude Reference. When the **CWS** Button is released at the desired altitude, the new altitude is established as the Altitude Reference.

If the Selected Altitude is captured during CWS maneuvering, the Altitude Reference is not changed. To adjust the Altitude Reference in this case, the **CWS** Button must be pressed again after the Selected Altitude is captured.

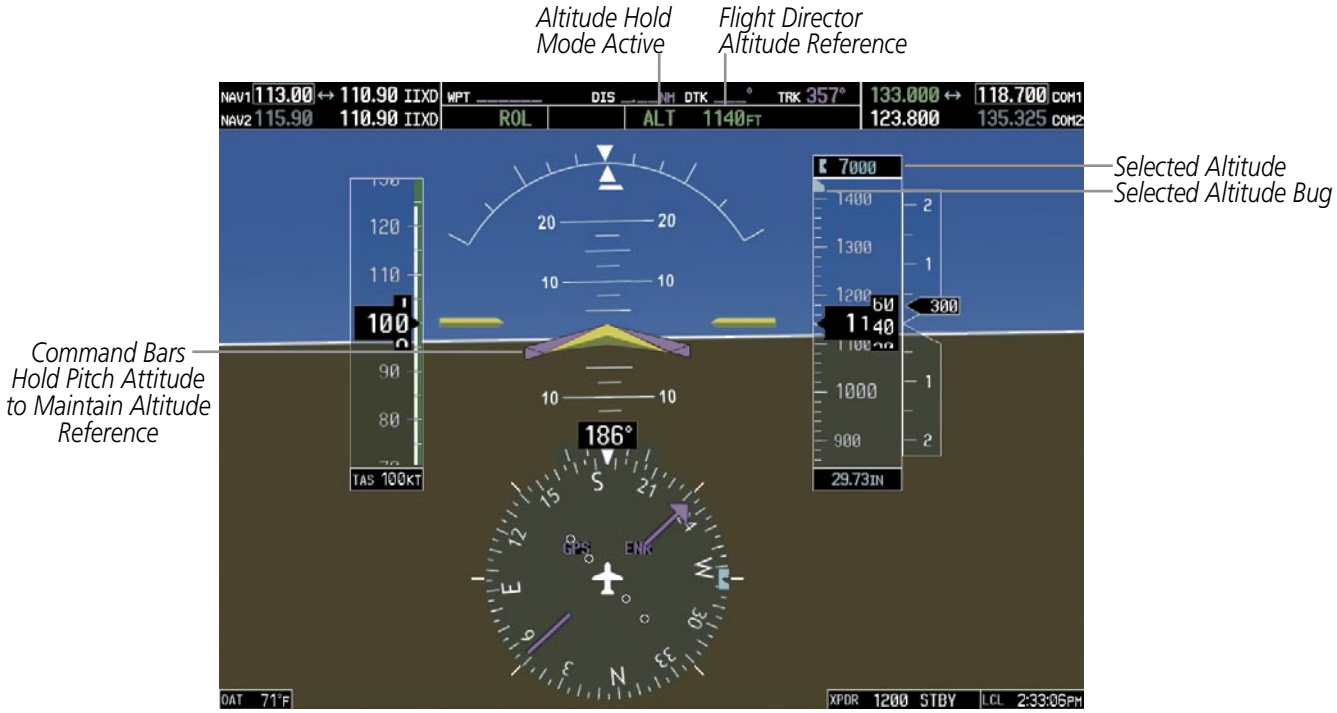


Figure 7-6 Altitude Hold Mode

VERTICAL SPEED MODE (VS)

In Vertical Speed Mode, the flight director acquires and maintains a Vertical Speed Reference. Current aircraft vertical speed (to the nearest 100 fpm) becomes the Vertical Speed Reference at the moment of Vertical Speed Mode activation. This mode may be used for climb or descent to the Selected Altitude (shown above the Altimeter) since Altitude Hold Mode is automatically armed when Vertical Speed Mode is selected. Vertical Speed Mode does not consider the relative position of the Selected Altitude in relation to the current aircraft altitude at the time of mode activation, so it is possible to use Vertical Speed Mode while not climbing/descending to the Selected Altitude.

Vertical Speed Mode is activated by pressing the **VS** Key; the 'VS' annunciation appears in the AFCS Status Box to indicate the active pitch mode, along with the Vertical Speed Reference to the right. The Vertical Speed Reference is also displayed above or below the Vertical Speed Indicator, depending on whether the aircraft is climbing or descending. A Vertical Speed Reference Bug corresponding to the Vertical Speed Reference is shown on the indicator.

Changing the Vertical Speed Reference

The Vertical Speed Reference (shown both in the AFCS Status Box and above/below the Vertical Speed Indicator) may be changed by:

- Using the **NOSE UP/NOSE DN** keys
- Pressing the **CWS** Button, hand-flying the aircraft to attain a new Vertical Speed Reference, then releasing the **CWS** Button

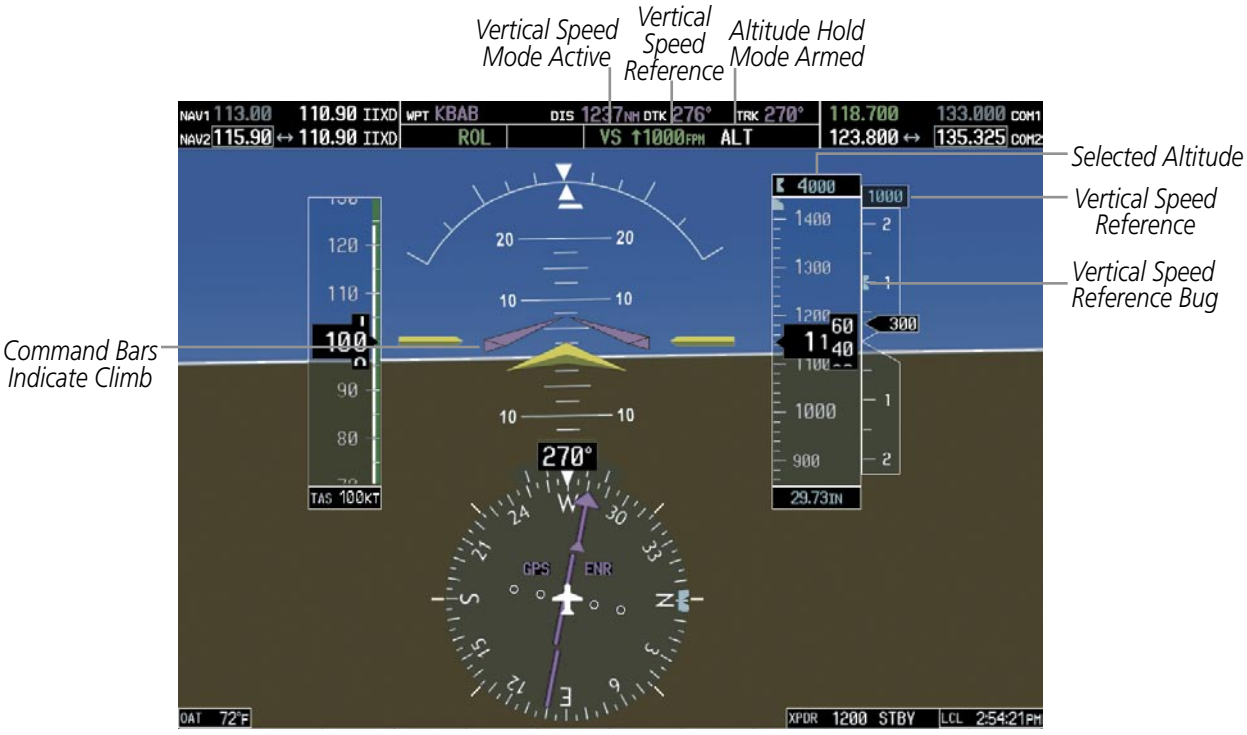


Figure 7-7 Vertical Speed Mode

FLIGHT LEVEL CHANGE MODE (FLC)

NOTE: *The Selected Altitude should be set before engaging Flight Level Change Mode.*

Flight Level Change Mode is selected by pressing the **FLC** Key. When Flight Level Change Mode is active, the flight director continuously monitors Selected Altitude, airspeed, and altitude. This mode acquires and maintains the Airspeed Reference while climbing or descending to the Selected Altitude (shown above the Altimeter). The Airspeed Reference is set to the current airspeed upon mode activation. Flight Level Change Mode is indicated by an 'FLC' annunciation beside the Airspeed Reference in the AFCS Status Box. The Airspeed Reference is also displayed directly above the Airspeed Indicator, along with a bug corresponding to the Airspeed Reference along the tape.

Engine power must be adjusted to allow the autopilot to fly the aircraft at a pitch attitude corresponding to the Airspeed Reference and the desired flight profile (climb or descent). The flight director maintains the current altitude until either engine power or the Airspeed Reference are adjusted and does not allow the aircraft to climb or descend away from the Selected Altitude.

Changing the Airspeed Reference

The Airspeed Reference (shown in both the AFCS Status Box and above the Airspeed Indicator) may be adjusted by:

- Using the **NOSE UP/NOSE DN** keys
- Pressing the **CWS** Button, hand-flying the aircraft to a new airspeed, then releasing the **CWS** Button to establish the new Airspeed Reference

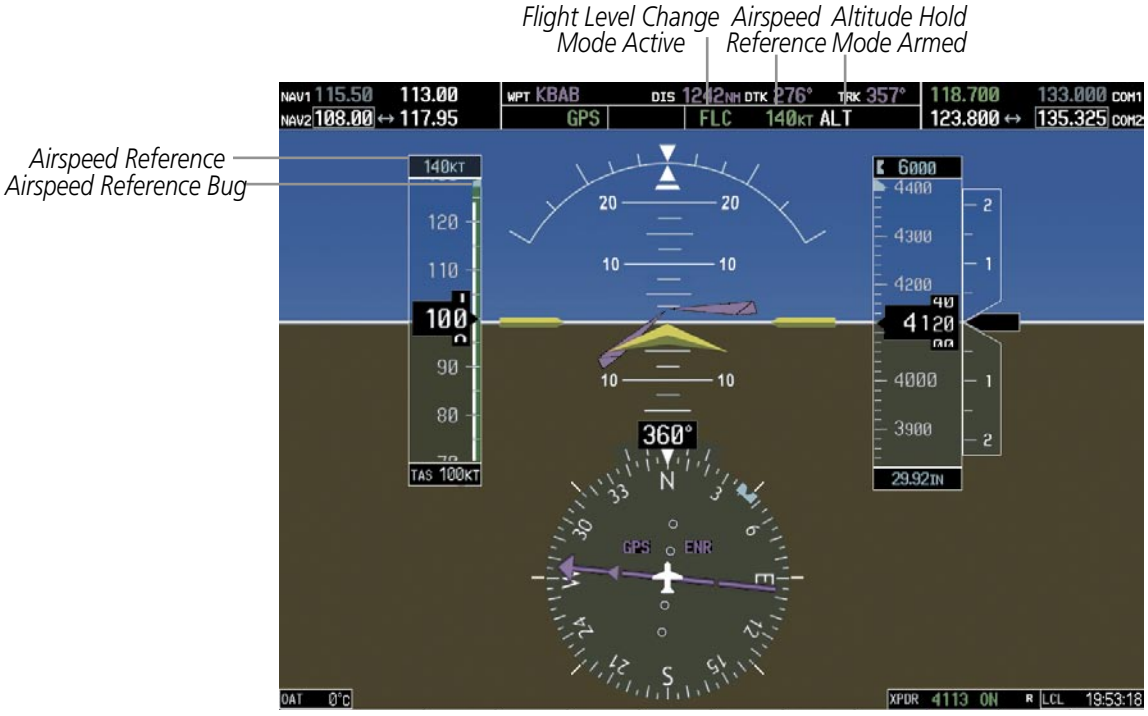


Figure 7-8 Flight Level Change Mode

GLIDESLOPE MODE (GS)

NOTE: *Pressing the **CWS** Button while Glideslope Mode is active does not cancel the mode. The autopilot guides the aircraft back to the glideslope upon release of the **CWS** Button.*

Glideslope Mode is only available when the flight director has been set for approach (see Approach Mode under roll modes) and is annunciated in the AFCS Status Box as 'GS'. Glideslope Mode is automatically armed under the following conditions:

- Valid localizer frequency is tuned
- Horizontal Situation Indicator (HSI) is in LOC mode, with valid deviation indication
- Valid glideslope deviation
- **APR** Key is pressed

Figure 7-9 Glideslope Mode Armed

Upon reaching the glideslope, the flight director transitions to Glideslope Mode and begins to intercept and track the glideslope.

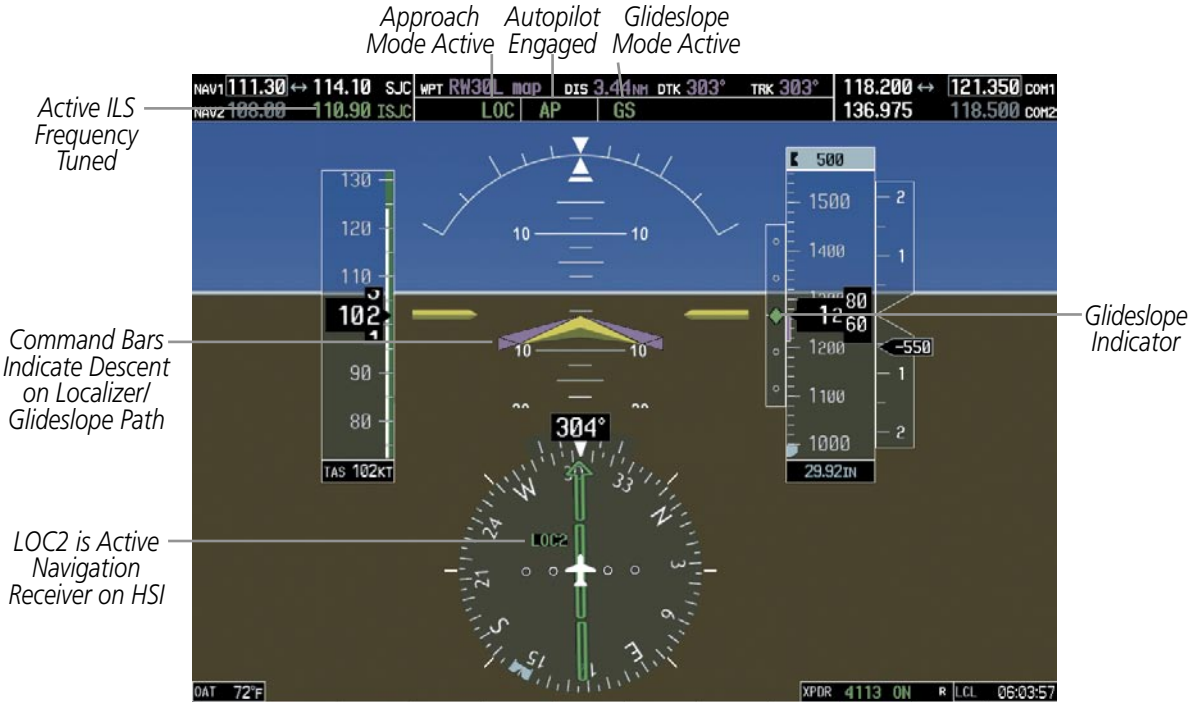


Figure 7-10 Glideslope Mode

GO AROUND (GA) MODE

Pushing the **GA** Button engages the flight director in a wings level, 7° pitch-up attitude, allowing the execution of a missed approach or a go around. This mode is a couple pitch and roll mode and is annunciated as 'GA' in both the pitch and roll active mode fields. Go Around Mode disengages the autopilot and arms Altitude Hold Mode automatically. Subsequent autopilot engagement is allowed. Attempts to modify the aircraft attitude (i.e., with the **CWS** Button or **NOSE UP/NOSE DN** keys) result in reversion to Pitch and Roll Hold modes.

Figure 7-11 Go Around Mode

ROLL MODES

The GFC 700 offers the following roll modes:

- **Roll Hold** (default mode) – Holds the current aircraft roll attitude or rolls the wings level, depending on the commanded bank angle
- **Heading Select** – Captures and tracks the Selected Heading
- **Navigation** (VOR, GPS, LOC, Backcourse) – Captures and tracks the selected navigation receiver on the HSI
- **Approach** (VOR, GPS, ILS) – Captures and tracks the selected receiver on the HSI with greater sensitivity for approach
- **Go Around** – Automatically disengages the autopilot and commands a constant pitch angle and wings level

The following table relates each roll mode to its respective control and annunciation. Refer to the pitch modes section for a discussion on Go Around Mode.

Roll Mode	Control	Annunciation
Roll Hold	(default)	ROL
Heading Select	**HDG** Key	HDG
Navigation, GPS Arm/Capture/Track	**NAV** Key	GPS
Navigation, VOR Enroute Arm/Capture/Track		VOR
Navigation, LOC Arm/Capture/Track (No Glideslope)		LOC
Navigation, Backcourse Arm/Capture/Track		BC
Approach, GPS Arm/Capture/Track	**APR** Key	GPS
Approach, VOR Arm/Capture/Track		VAPP
Approach, ILS Arm/Capture/Track (Glideslope Mode automatically armed)		LOC
Go Around	**GA** Button	GA

Table 7-2 Roll Modes

ROLL HOLD MODE (ROL)

When the flight director is activated (the **FD** or **AP** Key is pressed), Roll Hold Mode is selected by default. This mode is annunciated as 'ROL' in the AFCS Status Box.

Figure 7-12 Roll Hold Mode Annunciation

The current aircraft bank angle is held, subject to the bank angle conditions listed in Table 7-3.

Bank Angle	Flight Director Response
< 6°	Rolls wings level
6° to 22°	Maintains current aircraft roll attitude
> 22°	Limits bank to 22°

Table 7-3 Roll Hold Mode Responses

Changing the Roll Reference

The roll reference can be changed by pressing the **CWS** Button, establishing the desired bank angle, then releasing the **CWS** Button.

HEADING SELECT MODE (HDG)

NOTE: *Pressing the **CWS** Button and hand-flying the aircraft does not change the Selected Heading. The autopilot guides the aircraft back to the Selected Heading upon release of the **CWS** Button.*

NOTE: *Press the **HDG** Knob (the **SYNC** function) to synchronize the Selected Heading to the current heading.*

Heading Select Mode is activated by pressing the **HDG** Key. The annunciation 'HDG' appears in the AFCS Status Box to indicate Heading Select Mode. This mode acquires and maintains the Selected Heading shown on the PFD. The Selected Heading is adjusted using the **HDG** Knob on the PFD or MFD. The adjustment is shown by the Selected Heading Bug on the HSI and in the box to the left of the HSI.

Turns are commanded in the same direction as Selected Heading Bug movement, even if the Bug is turned more than 180° from the present heading (e.g., a 270° turn to the right). However, Selected Heading changes of more than 340° at a time result in turn reversals.

Figure 7-13 Heading Select Mode

NAVIGATION (GPS, VOR, LOC, BC) MODE

NOTE: *The selected navigation receiver must have a valid signal (VOR, LOC) or active GPS course in order for the flight director to enter Navigation or Approach Mode.*

NOTE: *When intercepting a flight plan leg, the flight director will give commands to capture the active leg at approximately a 45° angle to the track between the waypoints defining the active leg. The flight director will not give commands fly to the starting waypoint of the active leg.*

NOTE: *Pressing the **CWS** Button and hand-flying the aircraft does not change the Selected Course while in Navigation or Approach Mode. The autopilot guides the aircraft back to the Selected Course (or GPS flight plan) when the **CWS** Button is released.*

NOTE: *When making a backcourse approach, set the Selected Course to the localizer front course.*

Pressing the **NAV** Key activates Navigation Mode. Navigation Mode acquires and tracks the selected navigation receiver on the HSI (GPS, VOR, or LOC). The mode annunciation in the AFCS Status Box indicates the selected navigation receiver. The flight director follows GPS roll steering commands when the HSI is in GPS mode, and creates roll steering commands from the Selected Course and deviation when the HSI is in VOR or LOC mode. The Selected Course is controlled using the **CRS** Knob.

Navigation Mode can be used to fly non-precision GPS and LOC approaches where glideslope tracking is not required. Backcourse Navigation Mode is selected when the localizer front course is greater than 105° from the aircraft heading. The annunciation 'BC' in the AFCS Status Box indicates Backcourse Navigation Mode.

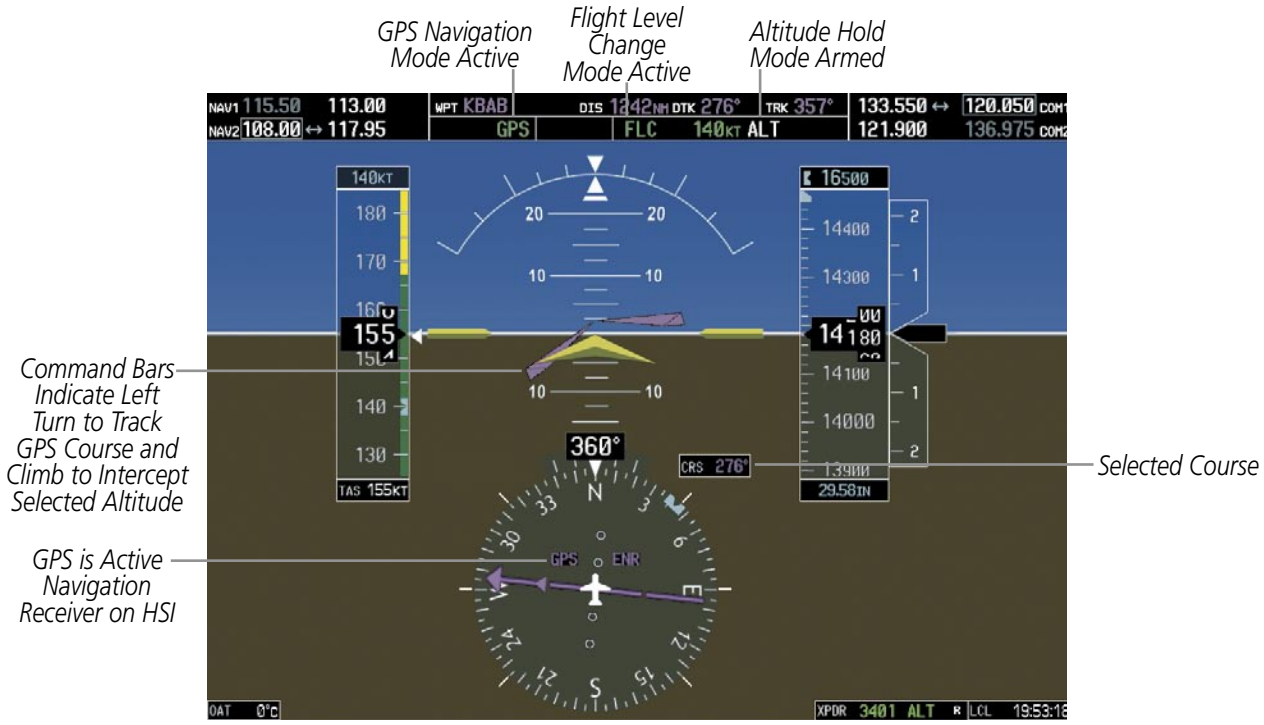


Figure 7-14 Navigation Mode

APPROACH (GPS, VAPP, LOC) MODE

Approach Mode is activated when the **APR** Key is pressed. Approach Mode acquires and tracks the selected navigation receiver on the HSI (GPS, VOR, or LOC). The mode annunciation corresponding to the selected navigation receiver (with the exception of VOR, which is annunciated 'VAPP' to indicate VOR Approach Mode) is displayed in the AFCS Status Box. This mode uses the selected navigation receiver deviation and desired course inputs to fly the approach.

Approach Mode provides greater sensitivity for VOR tracking than Navigation Mode and allows the autopilot to fly an ILS approach with a glideslope. Glideslope Mode is automatically armed when LOC Approach Mode is selected.

Figure 7-15 Approach Mode

Navigation/Approach Mode Armed

NOTE: *If the NAV radio is tuned to a different VOR while in VOR Navigation Mode, the flight director reverts to Roll Hold Mode (wings level) and arms VOR Navigation Mode.*

If the Course Deviation Indicator (CDI) shows greater than one dot when Navigation or Approach Mode is selected, the selected mode is automatically armed.

Figure 7-16 Navigation/Approach Mode Armed

The flight director remains in the active roll mode until entering capture phase, at which point Navigation or Approach Mode is annunciated as the active roll mode in green.

7.4 AUTOPILOT OPERATION

NOTE: *Refer to the AFMS for specific instructions regarding emergency procedures.*

The Beechcraft A36/G36's autopilot and yaw damper operate flight control surface servos to provide automatic flight control. The autopilot controls the aircraft pitch and roll attitudes following commands received from the flight director. Pitch autotrim provides trim commands to the pitch trim servo to relieve any sustained effort required by the pitch servo. The yaw damper reduces Dutch roll tendencies and coordinates turns.

FLIGHT CONTROL

Pitch and roll commands are provided to the servos, based on the active flight director modes. Servo motor control limits the maximum servo speed and torque. The servo mounts are equipped with slip-clutches set to certain values. This allows the servos to be overridden in case of an emergency.

PITCH AXIS AND PITCH TRIM

The autopilot pitch axis uses pitch rate to stabilize the aircraft pitch attitude during upsets and flight director maneuvers. Flight director pitch commands are rate- and attitude-limited, combined with pitch damper control, and sent to the pitch servo motor. The pitch servo measures the output effort (torque) and provides this signal to the pitch trim servo. The pitch trim servo commands the motor to reduce the average pitch servo effort.

When the autopilot is not engaged, the pitch trim servo may be used to provide manual electric trim. This allows the aircraft to be trimmed using a control stick switch rather than the trim wheel. Manual trim commands are generated only when both halves of the **MET** Switch are operated simultaneously. Trim speeds are scheduled with airspeed to provide more consistent response.

ROLL AXIS

The autopilot roll axis uses roll rate to stabilize aircraft roll attitude during upsets and flight director maneuvers. The flight director roll commands are rate- and attitude-limited, combined with roll damper control, and sent to the roll servo motor.

YAW AXIS

The yaw damper uses yaw rate and roll attitude to dampen the aircraft's natural Dutch roll response. It also uses lateral acceleration to coordinate turns. Yaw damper operation is independent of autopilot engagement.

ENGAGING THE AUTOPILOT AND YAW DAMPER

NOTE: *Autopilot engagement/disengagement is not equivalent to servo engagement/disengagement. Use the **CWS** Button to disengage the pitch and roll servos while the autopilot remains active.*

When the **AP** Key is pressed, the autopilot, yaw damper, and flight director are activated (if not already engaged). The flight director engages in Pitch and Roll Hold modes when initially activated. When the **YD** Key is pressed, the system engages the yaw damper independently of the autopilot (if not already engaged). Autopilot and yaw damper status are displayed in the center of the AFCS Status Box. Engagement is indicated by green 'AP' and 'YD' annunciations, respectively.

Figure 7-17 Autopilot and Yaw Damper Engaged

CONTROL WHEEL STEERING

During autopilot operation, the aircraft may be hand-flown without disengaging the autopilot. Pressing and holding the **CWS** Button disengages the pitch and roll servos from the flight control surfaces and allows the aircraft to be hand-flown. At the same time, the flight director is synchronized to the aircraft attitude during the maneuver. CWS activity has no effect on yaw damper engagement. The 'AP' annunciation is temporarily replaced by 'CWS' in white for the duration of CWS maneuvers.

In most scenarios, releasing the **CWS** Button reengages the autopilot with a new reference. Refer to the flight director modes section for CWS behavior in each mode.

Figure 7-18 CWS Annunciation

DISENGAGING THE AUTOPILOT AND YAW DAMPER

Automatic disengagement occurs due to:

- System failure
- Inability to compute default flight director modes (FD also disengages automatically)
- Invalid sensor data
- Stall warning (YD also disengages)

Automatic autopilot disengagement is indicated by a flashing red 'AP' annunciation and by the autopilot disconnect aural alert, which continue until acknowledged by pushing the **AP DISC** or **MET** ARM Switch.

Figure 7-19 Automatic Autopilot Disengagement

For the yaw damper, automatic disengagement occurs when autopilot disengagement is caused by a failure in a parameter also affecting the yaw damper. This means that the yaw damper can remain operational in some cases where the autopilot automatically disengages. The yaw damper also disengages upon a localized failure in the yaw damper system.

The autopilot may be manually disengaged by pushing the **AP DISC** Switch, **GA** Button, **MET** ARM Switch, or the **AP** Key. Manual disengagement is indicated by a five-second flashing yellow 'AP' annunciation and a two-second autopilot disconnect aural alert. The **AP DISC** or **MET** ARM Switch may be used to cancel the aural alert.

Figure 7-20 Manual Autopilot and Yaw Damper Disengagement

The **YD** Key or **AP DISC** Switch can be used to disengage the yaw damper. The 'YD' annunciation turns yellow and flashes for 5 seconds upon disengagement.

7.5 EXAMPLE PROCEDURES

NOTE: *The diagrams in this section are for instructional purposes only and should not be used for navigation.*

This section provides a scenario-based set of procedures showing various GFC 700 AFCS modes used during a flight. In this scenario, the aircraft departs Reid-Hillview Airport (KRHV) from runway 13L, enroute to Fresno Yosemite International Airport (KFAT). Per the filed flight plan, the aircraft climbs to an altitude of 7000 feet MSL at a heading of 070° to intercept airway V107.

Airway V107 is flown to Panoche VORTAC (PXN) using VOR navigation, then airway V230 is flown using a GPS flight plan. On this leg, the aircraft descends to 3000 feet prior to reaching Clovis VORTAC (CZQ) and the ILS approach to R29R at KFAT is loaded. The ILS approach is flown and a missed approach is executed.

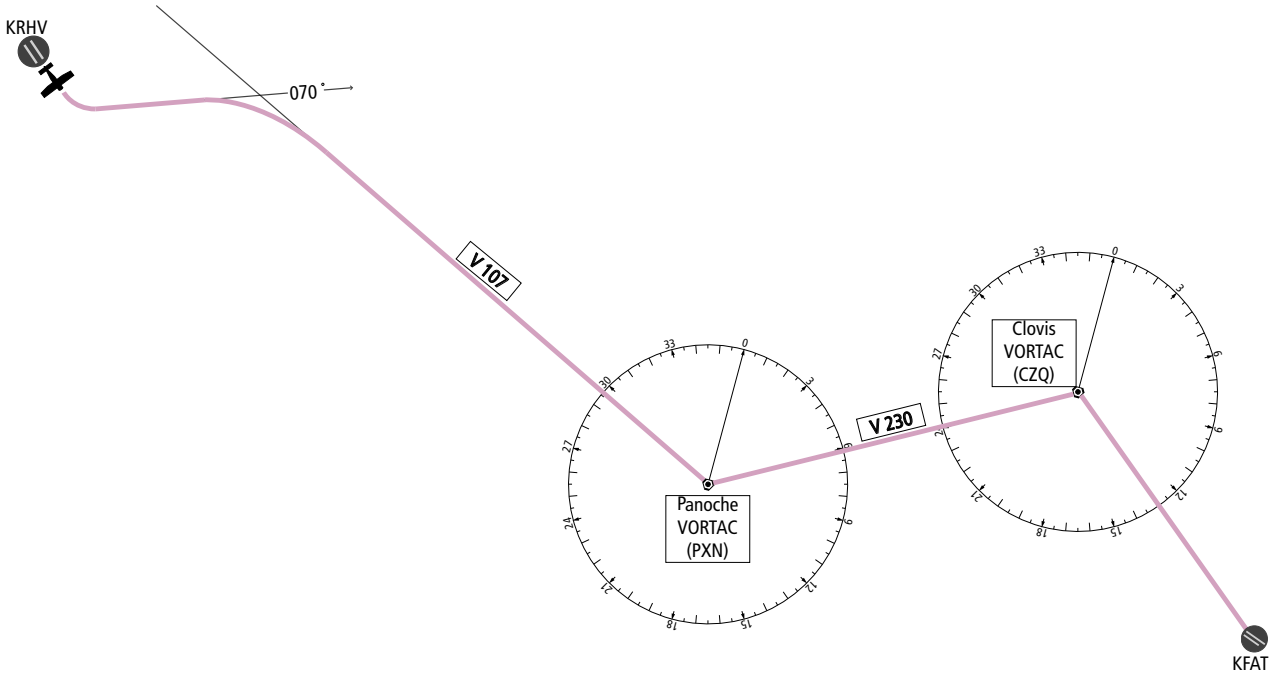


Figure 7-21 Flight Plan Overview

DEPARTURE

Climbing to the Selected Altitude and flying an assigned heading:

1) Upon takeoff, set the Selected Altitude to 7000 feet using the **ALT** Knob.

To have the autopilot capture this altitude, use Pitch Hold, Vertical Speed, or Flight Level Change Mode. In this example, Vertical Speed Mode is used.

2) Upon reaching the desired vertical speed of 1000 fpm, enable the flight director in Vertical Speed Mode.

a) Press the **VS** Key. Altitude Hold Mode is armed automatically.

b) Press the **AP** Key to engage the autopilot in Roll Hold and Vertical Speed modes

3) Activate Heading Select Mode while the autopilot is engaged in the climb.

a) Use the **HDG** Knob to set the Selected Heading to 070°.

b) Press the **HDG** Key. The autopilot follows the Selected Heading Bug on the HSI and turns the aircraft to the desired heading.

4) As the aircraft climbs to the Selected Altitude, the flight director changes from Vertical Speed to Altitude Hold Mode. This active mode change is indicated by the green 'ALT' annunciation flashing for 10 seconds.

Upon reaching the Selected Altitude, the autopilot completes the capture process and levels the aircraft. From this point, the flight director continues to operate in Altitude Hold Mode.

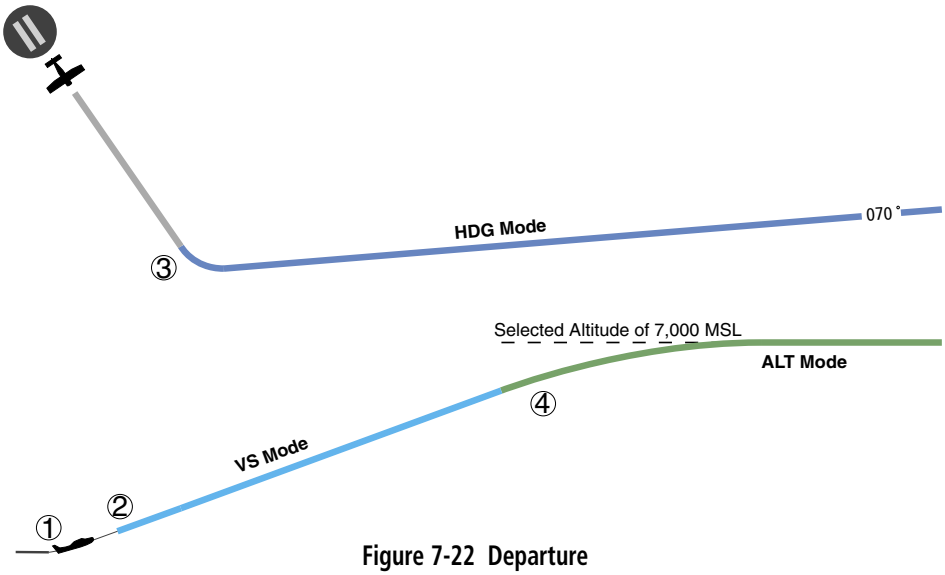


Figure 7-22 Departure

INTERCEPTING A VOR

During climb-out, the autopilot continues to fly the aircraft in Heading Select Mode. Airway V107 to Panoche VORTAC (PXN) should now be intercepted.

Intercepting a VOR:

1) Tune the VOR frequency and activate Navigation Mode.

a) Use the **CDI** Softkey to set the HSI navigation source to VOR.

b) Use the **CRS** Knob to set the Selected Course to 116°. Note that at this point, the flight director is still in Heading Select Mode and the autopilot continues to fly 070°.

c) Press the **NAV** Key to arm Navigation Mode. The white annunciation 'VOR' appears as the armed roll mode.

2) When the CDI shows less than one dot, the flight director changes from Heading Select to Navigation Mode, and the green annunciation 'VOR' flashes. The autopilot begins turning to intercept the Selected Course.

3) The autopilot continues the turn until the aircraft is established on the Selected Course.

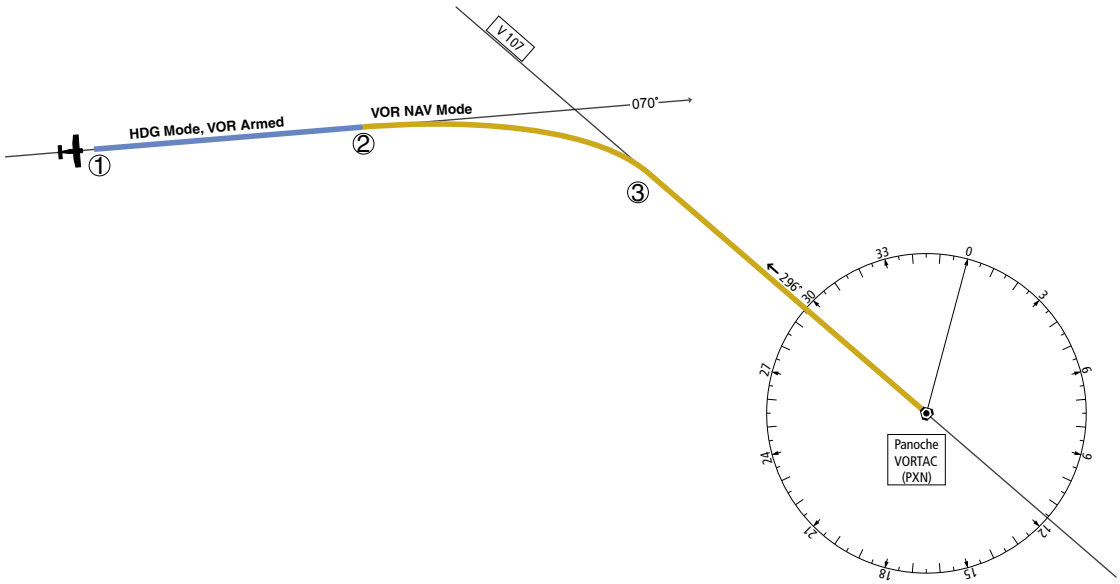


Figure 7-23 Intercepting a VOR

FLYING A FLIGHT PLAN/GPS COURSE

NOTE: *Changing the navigation source cancels the flight director's Navigation Mode and causes the flight director to automatically revert to Roll Hold Mode, wings level.*

As the aircraft closes on Panoche VORTAC, a GPS flight plan is entered for the next leg, airway V230. To do this, PXN, CZQ, and KFAT are entered into the active flight plan.

The aircraft is currently tracking inbound on the 116° radial of Panoche VORTAC.

Flying a GPS flight plan:

1) Enter Panoche VORTAC (PXN) and Clovis VORTAC (CZQ) into the GPS flight plan, in preparation to intercept this leg.

2) Transition from VOR to GPS Navigation Mode.

a) Use the **CDI** Softkey to put the HSI in GPS mode. This cancels VOR mode on the HSI and the flight director loses the VOR signal. As a result, the VOR annunciation flashes yellow as the autopilot rolls the wings level.

b) Press the **NAV** Key to activate GPS Navigation Mode and cause the autopilot to steer the aircraft toward the active flight plan leg.

If the **NAV** Key is not pressed within 10 seconds of the VOR signal loss, the flight director reverts to Roll Hold Mode

3) Once the flight plan leg is intercepted, the autopilot continues to track GPS guidance to the end of the flight plan.

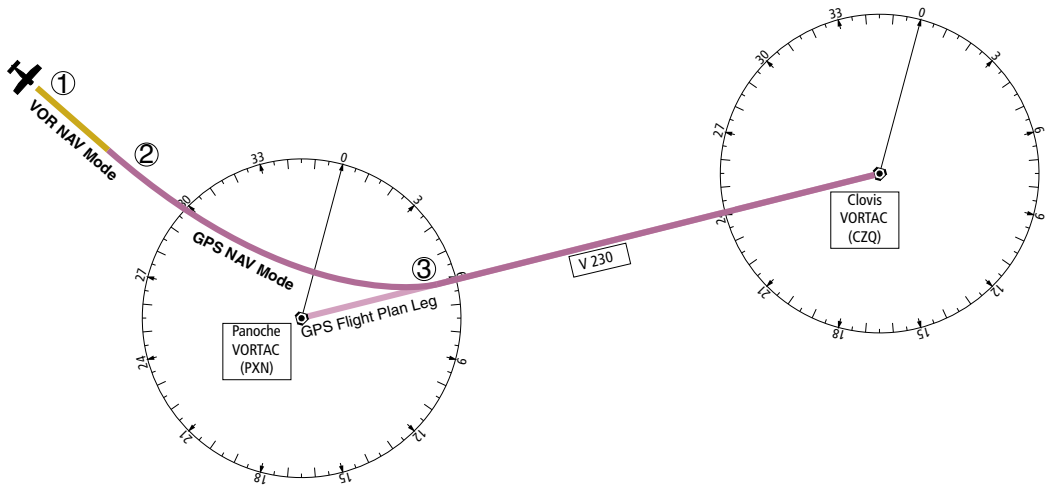


Figure 7-24 Transition to GPS Flight Plan

FLIGHT LEVEL CHANGE DESCENT

While flying the GPS leg from Panoche VORTAC to Clovis VORTAC, the aircraft is cleared to make a descent to 3000 feet in preparation for the approach to KFAT.

Making a Flight Level Change descent:

1) Enter Flight Level Change Mode.

a) Using the **ALT** Knob, set the Selected Altitude to 3000 feet.

b) Press the **FLC** Key to activate Flight Level Change Mode. The annunciation 'FLC' appears next to the Airspeed Reference, which defaults to the current aircraft airspeed, 142 knots. Altitude Hold Mode is armed automatically.

2) Reduce power to allow descent in Flight Level Change Mode. The autopilot maintains the Airspeed Reference.

3) Upon capturing the Selected Altitude, the flight director changes from Flight Level Change to Altitude Hold Mode. The annunciation 'ALT' flashes in green to indicate the altitude capture. After the capture is complete, the autopilot holds the aircraft level at the Selected Altitude.

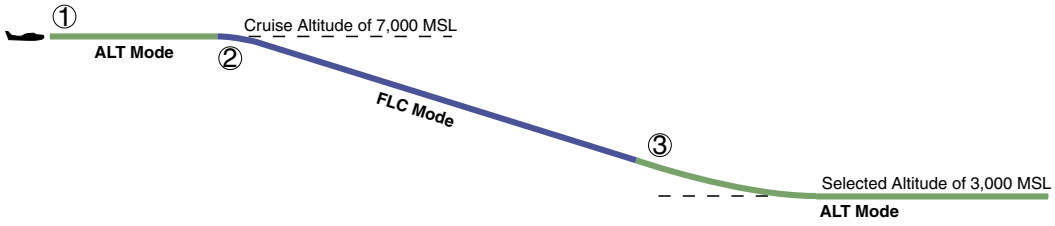


Figure 7-25 FLC Descent

ILS APPROACH

Flying an ILS approach:

1) Transition from GPS Navigation Mode to Heading Select Mode.

a) Load the Runway 29R ILS approach for KFAT into the Flight Plan and select 'Vectors to Final' for the transition.

b) Set the Selected Heading after getting vectors from ATC and press the **HDG** Key. The autopilot turns the aircraft to the desired heading.

2) Use Heading Select Mode to comply with ATC vectors as requested.

3) In preparation for approach, tune the localizer frequency and select LOC mode on the HSI.

4) Press the **APR** Key when cleared for approach to arm LOC Approach and Glideslope modes.

The autopilot and flight director determine when to begin the turn to intercept the final approach course.

5) The autopilot flies the ILS Approach. At the Decision Height, there are two options:

a) Push the **AP DISC** Switch and land the aircraft

OR:

b) Use the **GA** Button to execute a missed approach (refer to the following procedure).

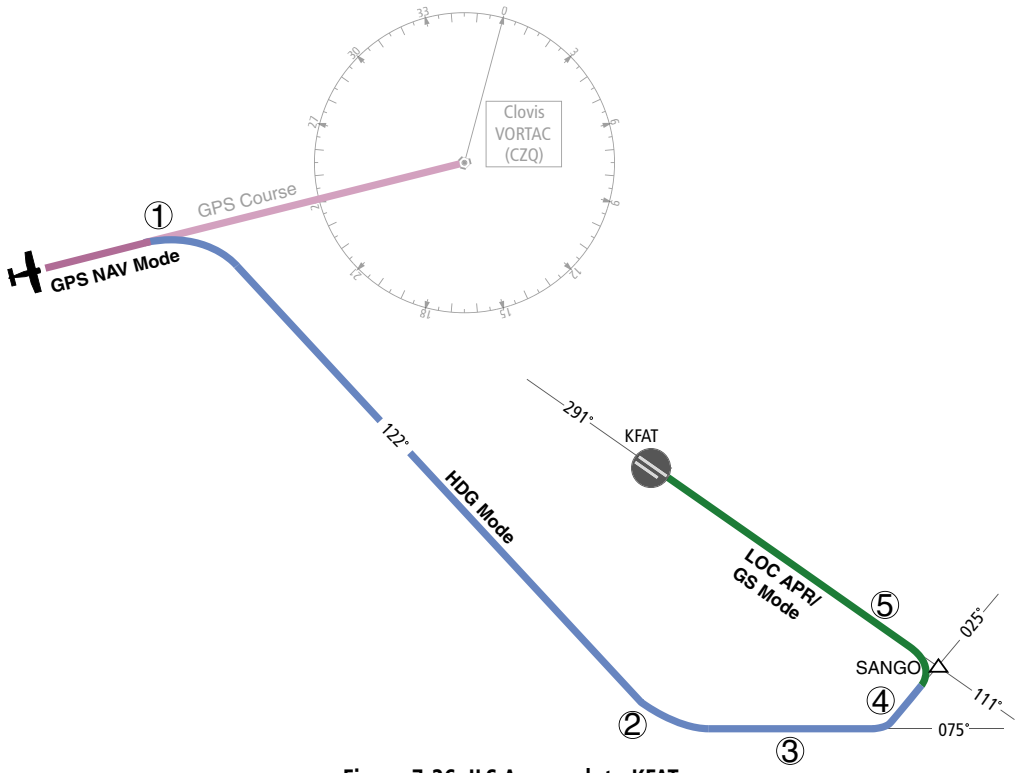


Figure 7-26 ILS Approach to KFAT

GO AROUND/MISSED APPROACH

NOTE: *As a result of the calculations being performed by the system while flying the holding pattern, the display may re-size automatically and the aircraft may not precisely track the holding pattern.*

Flying a missed approach:

1) Push the **GA** Button at the Decision Height and apply full power to execute a missed approach. The Command Bars establish a nose-up climb to follow.

Note that when the **GA** Button is pushed, the autopilot disconnects and the 'AP' annunciation flashes yellow for 5 seconds.

2) Start the climb to the prescribed altitude in the published Missed Approach Procedure.

a) Press the **AP** Key to re-engage the autopilot.

b) Select the **CDI** Softkey to set the HSI to GPS navigation mode.

c) Press the **NAV** Key to have the autopilot fly to the hold.

d) Select the **SUSP** Softkey to resume sequencing approach legs to the Missed Approach Hold Point (MAHP). The autopilot flies direct to Clovis VORTAC according to the loaded approach.

3) Use the **ALT** Knob to set a Selected Altitude to hold. The **CWS** Button may be used to set a new pitch attitude.

As the Selected Altitude is captured, Altitude Hold Mode becomes active and the autopilot maintains the Selected Altitude.

4) To use the autopilot to fly the hold, set the Selected Heading using the **HDG** Knob and press the **HDG** Key. Use the **HDG** Knob to guide the aircraft for the remainder of the hold.

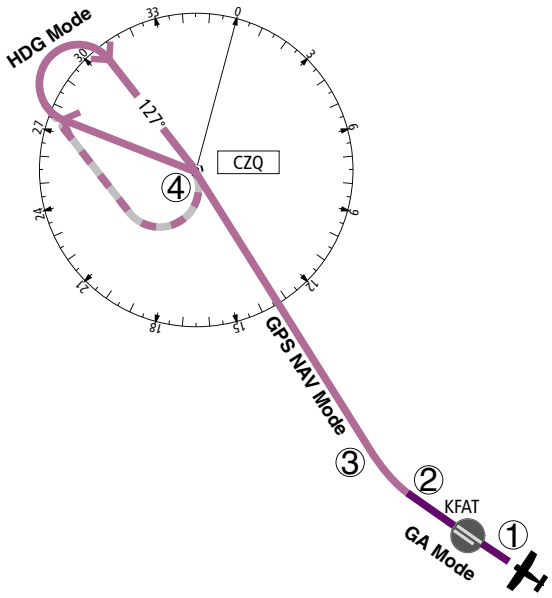


Figure 7-27 Go Around/Missed Approach

7.6 AFCS ANNUNCIATIONS AND ALERTS

AFCS STATUS ALERTS

The following annunciations (listed in order of increasing priority) can appear on the PFD above the Airspeed and Attitude indicators. Only one annunciation occurs at a time, and messages are prioritized by criticality.

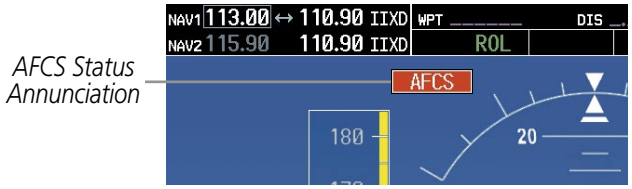


Figure 7-34 AFCS Status Annunciation

Alert Condition	Annunciation	Description
Rudder Mistrim Right	RUD→	Yaw servo providing sustained force in the indicated direction
Rudder Mistrim Left	←RUD	
Aileron Mistrim Right	AIL→	Roll servo providing sustained force in indicated direction
Aileron Mistrim Left	←AIL	
Elevator Mistrim Down	↓ELE	Pitch servo providing sustained force in the indicated direction
Elevator Mistrim Up	↑ELE	
Pitch Trim Failure (or Stuck **MET** Switch)	PTRM	If AP engaged, take control of the aircraft and disengage AP If AP disengaged, move **MET** switches separately to unstick
Yaw Damper Failure	YAW	YD control failure; AP also inoperative
Roll Failure	ROLL	Roll axis control failure; AP inoperative
Pitch Failure	PTCH	Pitch axis control failure; AP inoperative
System Failure	AFCS	AP and MET are unavailable; FD may still be available
Preflight Test	PFT	Performing preflight system test; aural alert sounds at completion Do not press the **AP DISC** Switch during servo power-up and preflight system tests as this may cause the preflight system test to fail or never to start (if servos fail their power-up tests). Power must be cycled to the servos to remedy the situation.
	PFT	Preflight system test failed; aural alert sounds at failure

Table 7-4 AFCS Status Alerts

OVERSPEED PROTECTION

While in Pitch Hold, Vertical Speed, or Flight Level Change Mode, airspeed is monitored by the flight director. In these modes, commands are limited for overspeed protection. Overspeed protection is provided to ensure the flight director cannot command an attitude which would exceed the certified maximum autopilot airspeed.

When an autopilot overspeed warning occurs, the Airspeed Reference Box appears above the Airspeed Indicator, flashing a yellow 'MAXSPD' annunciation. Engine power should be reduced and/or the pitch reference adjusted to slow the aircraft. The annunciation disappears when the overspeed condition is resolved and the previous pitch mode resumes control.

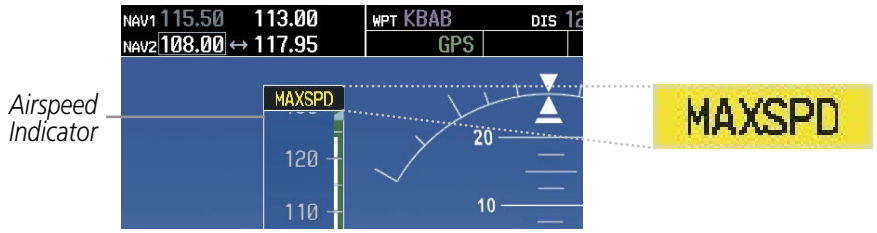


Figure 7-29 Overspeed Annunciation

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SECTION 8 ADDITIONAL FEATURES

8.1 GDL 69A DATA LINK RECEIVER – XM DIGITAL AUDIO ENTERTAINMENT (OPTIONAL)

NOTE: *Refer to the Hazard Avoidance section for more information about XM Weather products.*

The optional XM Radio entertainment feature of the GDL 69A Data Link Receiver is available for the pilot's and passengers' enjoyment. Entertainment audio is not available on the GDL 69 Data Link Receiver. The XM Radio entertainment feature of the Data Link Receiver is explained in this section.

XM SATELLITE RADIO SERVICE

Digital audio entertainment is available through the XM Satellite Radio Service, received by the GDL 69A Data Link Receiver. XM Satellite Radio offers a variety of radio programming over long distances without having to constantly search for new stations. Based on signals from satellites, coverage far exceeds land-based transmissions.

Entertainment audio must be set up with the MFD softkeys.

If problems occur, ensure that the owner/operator of the aircraft has subscribed to XM Radio service, and that the XM subscription has been activated. If a failure still exists, elementary diagnostic checks of the system are explained in the appendix section for troubleshooting the datalink receiver.

XM INFORMATION PAGE

NOTE: *The **DONE** Softkey on the XM Information Page (Auxiliary Page Group) is used to save GDL 69A activation data when the XM services are initially set up. It is not used during normal XM Radio operation, but there should be no adverse effects if inadvertently selected during flight. Refer to the GDL 69/69A XM Satellite Radio Activation Instructions (190-00355-04, Rev F or later) for further information.*

The XM Information Page provides XM Radio identification numbers, service level, and weather products.

Selecting the XM Information Page:

1) Turn the large **FMS** Knob to select the Auxiliary Page Group.
2) Turn the small **FMS** Knob to select the AUX - XM Information Page (fifth page of six in the AUX Group). **RADIO** and **INFO** Softkeys are displayed.
3) Press the **INFO** Softkey to show Radio IDs, Service Class, and Weather Products.

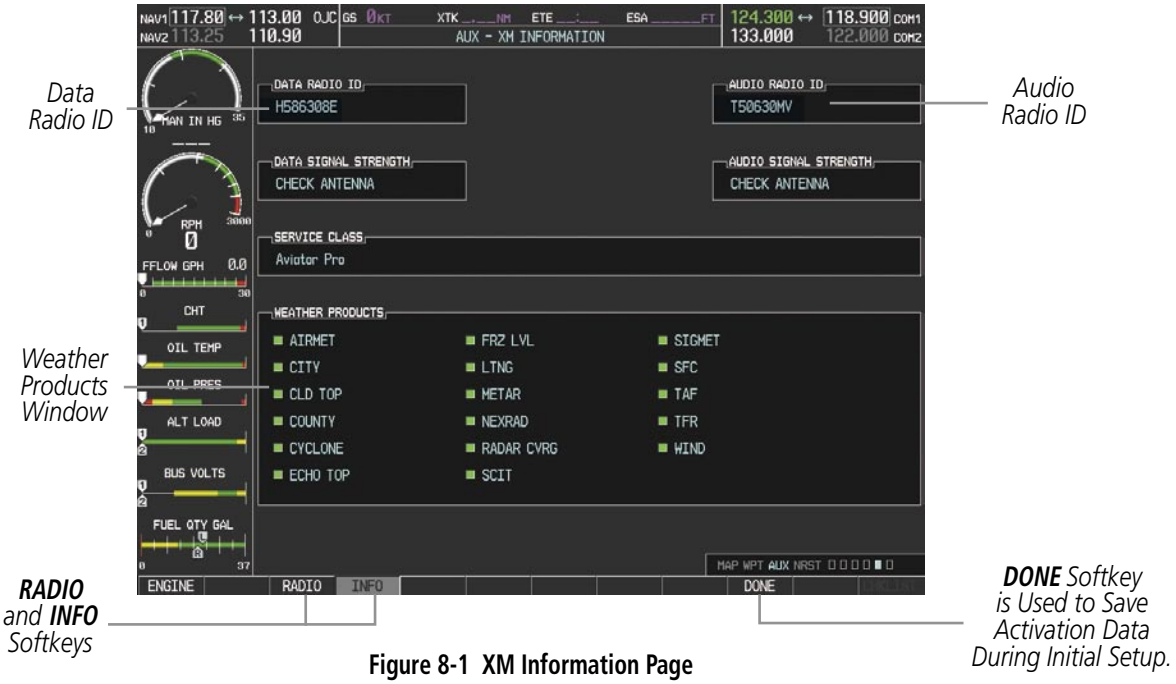


Figure 8-1 XM Information Page

Each Data Link Receiver contains a unique Data Radio ID and Audio Radio IDs that allow XM to communicate with the radio. The owner must activate XM service by providing the appropriate Radio ID(s) to XM to authorize the installed services for that radio. If XM services have not been activated, all the weather product boxes are cleared on the XM Information Page and a yellow 'Activation Required' message shows up in the center of the Weather Data Link Page (Map Page Group).

The 'Service Class' refers to the groupings of weather products available for subscription.

The Weather Products Window shows the list of available weather products and indicates the selected products for the current subscription. The boxes for active weather products are filled. Before activation, all boxes are cleared.

XM RADIO PAGE

The XM Radio Page provides information and control of the audio entertainment features of the XM Satellite Radio.

Selecting the XM Radio Page:

1) Turn the large **FMS** Knob to select the Auxiliary Page Group.
2) Turn the small **FMS** Knob to select the displayed AUX - XM Information Page.
3) Press the **RADIO** Softkey to show the XM Radio Page where audio entertainment is controlled.

Figure 8-2 XM Radio Page

ACTIVE CHANNEL AND CHANNEL LIST

The Active Channel Box on the XM Radio Page displays the currently selected channel that the XM Radio is using.

The Channels List Box of the XM Radio Page shows a list of the available channels for the selected category. Channels can be stepped through one at a time or may be selected directly by channel number.

Stepping through channels one at a time:

1) While on the XM Radio Page, press the **CHNL** Softkey.

   Or:

2) Press the **FMS** Knob to highlight the channel list and turn the large **FMS** Knob to scroll through the channels.
3) Press the **CH +** Softkey to go up through the list in the Channel Box, or move down the list with the **CH –** Softkey.

Selecting a channel directly:

1) While on the XM Radio Page, press the **CHNL** Softkey.
2) Press the **DIR CH** Softkey. The channel number in the Active Channel Box will be highlighted.
3) Press the numbered softkeys located on the bottom of the display to directly select the desired channel number.
4) Press the **ENT** Key to activate the selected channel.

CATEGORY

The Category Box of the XM Radio Page displays the currently selected category of audio. Categories of channels such as jazz, rock, or news can be selected to list the available channels for a type of music or other contents. One of the optional categories is 'PRESETS' to view channels that have been programmed.

Selecting a category:

1) Select the **CATGRY** Softkey on the XM Radio Page.
2) Press the **CAT +** and **CAT -** Softkeys to cycle through the categories.

   Or:

3) Turn the small **FMS** Knob to display the 'Categories' list. Highlight the desired category with the small **FMS** Knob and press the **ENT** Key. Selecting 'All Categories' places all channels in the list.

Figure 8-3 Categories List

PRESETS

Up to 15 channels from any category can be assigned a preset number. The Preset channels are selected by pressing the **PRESETS** and **MORE** Softkeys. Then the preset channel can be selected directly and added to the Channel List for the Presets category.

Setting a preset channel number:

1) On the XM Radio Page, while listening to an Active Channel that is wanted for a preset, press the **PRESETS** Softkey to access the first five preset channels (**PS1 - PS5**).
2) Press the **MORE** Softkey to access the next five channels (**PS6 – PS10**), and again to access the last five channels (**PS11 – PS15**). Pressing the **MORE** Softkey repeatedly cycles through the preset channels.
3) Press any one of the (**PS1 - PS15**) softkeys to assign a number to the active channel.
4) Press the **SET** Softkey on the desired channel number to save the channel as a preset.

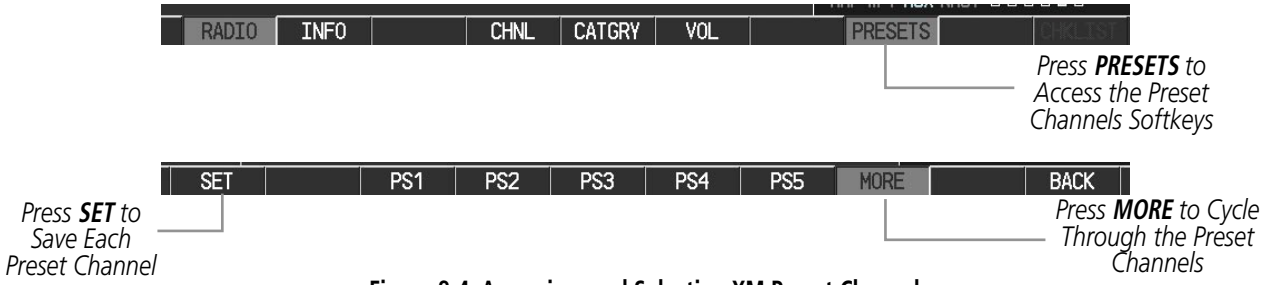


Figure 8-4 Accessing and Selecting XM Preset Channels

VOLUME

Radio volume is shown as a percentage. Volume level is controlled by pressing the **VOL** Softkey, which brings up the **MUTE** Softkey and the volume increase and decrease softkeys.

Adjusting the volume:

1) With the XM Radio Page displayed, press the **VOL** Softkey.
2) Press the **VOL –** Softkey to reduce volume or press the **VOL +** Softkey to increase volume. (Once the **VOL** Softkey is pressed, the volume can also be adjusted using the small **FMS** Knob.)
3) Press the **MUTE** Softkey to mute the audio. Press the **MUTE** Softkey again to un-mute the audio.

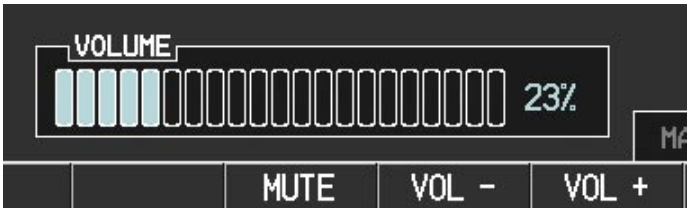


Figure 8-5 Volume Control

ANNUNCIATIONS AND ALERTS

AIRCRAFT ALERTS

NOTE: *The Beechcraft A36/G36 Pilot's Operating Handbook (POH) supersedes information found in this document.*

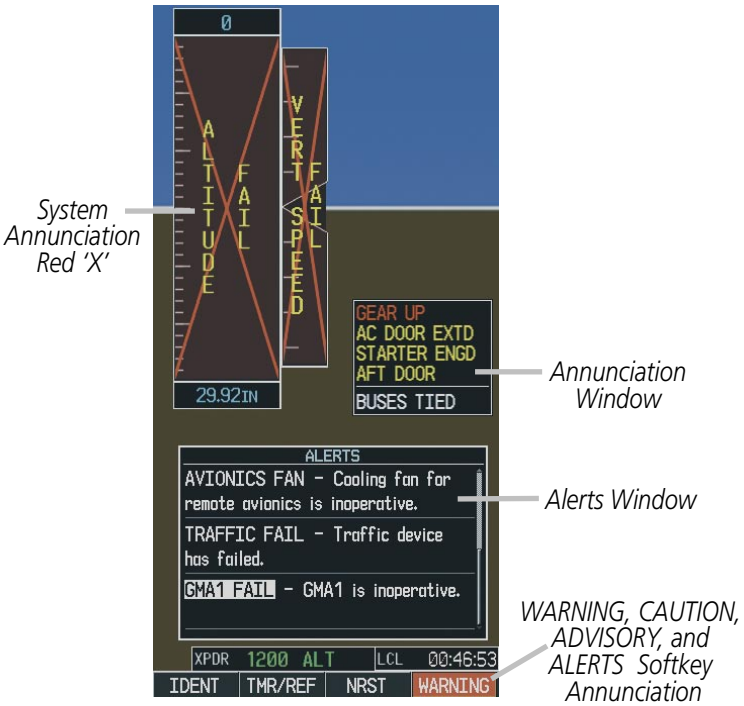


Figure A-1 G1000 Alerting System

The G1000 Alerting System conveys alerts to the pilot using a combination of the following items:

- **Annunciation Window**: The Annunciation window displays abbreviated annunciation text. The Annunciation Window is located to the right of the Altitude and Vertical Speed windows on the PFD display (or the MFD if system is in reversionary mode). All A36/G36 annunciations can be displayed simultaneously. A white horizontal line separates annunciations that are acknowledged from annunciations that are not yet acknowledged. Acknowledged annunciations are always above the line. Annunciations are displayed in order of priority from top to bottom. The highest priority annunciation is displayed at the top of the Annunciation Window.
- **Alerts Window:** The Alerts window displays annunciation and alert message text. Up to 64 prioritized alerts can be displayed in the Alerts Window. Pressing the **ALERTS** Softkey displays the Alerts Window. Pressing the **ALERTS** Softkey again removes the Alerts Window from the display. When the Alerts Window is displayed, the pilot may use the large **FMS** Knob to scroll through the alert list. Higher priority alerts are displayed at the top of the window. Lower priority alerts are displayed at the bottom of the window. Active alerts are displayed in white text. Alerts that have become inactive will change to gray text. The **ALERTS** Softkey will flash if the state of a displayed alert changes or a new alert is displayed. The inactive alerts can be removed from the Alerts window by pressing the flashing **ALERTS** Softkey.

- **ALERTS Softkey Annunciation**: When an alert is issued, the **ALERTS** Softkey is used as a flashing annunciation to accompany an alert. During the alert, the **ALERTS** Softkey assumes a new label consistent with alert level (WARNING, CAUTION, or ADVISORY). Pressing the softkey annunciation acknowledges that the pilot is aware of the alert. The softkey then returns to the previous **ALERTS** label. The pilot can then press the **ALERTS** Softkey again to view alert text messages.
- **System Annunciations**: Typically, a large red 'X' appears in a window when a related LRU fails or detects invalid data. A red 'X' is accompanied by an alert message in the Alerts Window.
- **Audio Alerting System:** The G1000 system issues audio alert tones when specific system conditions are met. See the Alert Levels Definitions section for more information.

ALERT LEVEL DEFINITIONS

The G1000 Alerting System, as installed in Beechcraft A36/G36 aircraft, uses four alert levels.

- **WARNING:** This level of alert is time critical and requires immediate pilot attention. A warning annunciation is displayed in the Annunciation Window as *red* text. A warning annunciation is also accompanied by a flashing red **WARNING** Softkey label, as shown in Figure 12-2. Pressing the **WARNING** Softkey acknowledges the presence of the warning alert, and stops the aural tone (if applicable). The softkey has now reverted to the **ALERTS** Softkey label and displays a description of the warning annunciation in the Alerts Window when pressed.
- **CAUTION:** This level of alert indicates the existence of abnormal conditions on the aircraft that may require pilot intervention. A caution annunciation is displayed in the Annunciation Window as *yellow* text. A caution annunciation is also accompanied by a flashing yellow **WARNING** Softkey label, as shown in Figure 12-3. Pressing the **CAUTION** Softkey acknowledges the presence of the caution alert. The softkey has now reverted to the **ALERTS** Softkey label and displays a description of the caution annunciation in the Alerts Window when pressed.
- **ADVISORY ANNUNCIATION:** This level of alert provides general information to the pilot that may not need immediate attention. An advisory annunciation is displayed in the Annunciation Window as *white* text. An advisory annunciation is also accompanied by a flashing white **ADVISORY** Softkey label, as shown in Figure 12-4. Pressing the **ADVISORY** Softkey acknowledges the presence of the advisory alert. The softkey has now reverted to the **ALERTS** Softkey label and displays a description of the advisory annunciation in the Alerts Window when pressed.
- **ALERT MESSAGE:** These messages are provided to make the pilot aware of G1000 system problems or status, and may not require pilot action. An alert message is accompanied by a flashing white **ADVISORY** Softkey label, as shown in Figure 12-4. Pressing the **ADVISORY** Softkey acknowledges the presence of the advisory alert, The softkey has now reverted to the **ALERTS** Softkey label and displays a description of the alert message in the Alerts Window when pressed.

Figure A-2 WARNING Softkey Annunciation

Figure A-3 CAUTION Softkey Annunciation

Figure A-4 ADVISORY Softkey Annunciation

A36/G36 AIRCRAFT ANNUNCIATIONS & ALERTS

The following alert annunciations are configured specifically for the Beechcraft A36/G36 aircraft. See the Beechcraft A36/G36 Pilot's Operating Handbook (POH) for information regarding pilot responses.

WARNING Annunciation

Annunciation Window Text	Alerts Window Message	Audio Alert
GEAR UP	Gear up.	Continuous Tone (received through the G1000 audio from another source)
ALT 1 INOP	Alternator 1 offline.	Repeating Tone
ALT 2 INOP	Alternator 2 offline.	Repeating Tone
ALT 1-2 INOP	Alternators 1 and 2 offline.	Repeating Tone

CAUTION Annunciation

Annunciation Window Text	Alerts Window Message	Audio Alert
AC DOOR EXTD	Air conditioner on and door extended.	Single Chime
STARTER ENGD	Starter relay has power applied.	Single Chime
BUS1 VOLT HI	Bus 1 voltage greater than 30 VDC.	Single Chime
BUS2 VOLT HI	Bus 2 voltage greater than 30 VDC.	Single Chime
AFT DOOR	Aft door not latched.	Single Chime

ADVISORY Annunciation

Annunciation Window Text	Alerts Window Message	Audio Alert
BUSES TIED	Bus 2 is tied to Bus 1.	None

Alert Message

Alerts Window Message	Audio Alert
PFD FAN FAIL – The cooling fan for the PFD is inoperative.	None
MFD FAN FAIL – The cooling fan for the MFD is inoperative.	None
AVIONICS FAN – The cooling fan for remote avionics is inoperative.	None

AFCS ALERTS

System Status Field

The following AFCS alert annunciations appear in the AFCS System Status field on the PFD.

- **WARNING:** Red annunciation is time critical and indicates an abnormal AFCS condition requiring immediate pilot attention.
- **CAUTION:** Yellow annunciation indicates the existence of abnormal AFCS conditions that may require pilot intervention.

Condition	Annunciation	Description
Pitch Failure	PTCH	Pitch axis control failure. AP is inoperative.
Roll Failure	ROLL	Roll axis control failure. AP is inoperative.
MET Switch Stuck, or Pitch Trim Axis Control Failure	PTRM	If annunciated when AP is engaged, take control of the aircraft and disengage the autopilot. If annunciated when AP is not engaged, move each half of the MET switch separately to check if a stuck switch is causing the annunciation.
Yaw Damper Failure	YAW	Yaw Damper control failure.
System Failure	AFCS	AP and MET are unavailable. FD may still be available.
Elevator Mistrim Up	↑ELE	A condition has developed causing the pitch servo to provide a sustained force. Be prepared to apply nose up control wheel force upon autopilot disconnect.
Elevator Mistrim Down	↓ELE	A condition has developed causing the pitch servo to provide a sustained force. Be prepared to apply nose down control wheel force upon autopilot disconnect.
Aileron Mistrim Left	←AIL	A condition has developed causing the roll servo to provide a sustained left force. Ensure the slip/skid indicator is centered and observe any maximum fuel imbalance limits.
Aileron Mistrim Right	AIL→	A condition has developed causing the roll servo to provide a sustained right force. Ensure the slip/skid indicator is centered and observe any maximum fuel imbalance limits.
Rudder Mistrim Left	←RUD	A condition has developed causing the yaw servo to provide a sustained force. Ensure the slip/skid indicator is centered and observe any maximum fuel imbalance limits.
Rudder Mistrim Right	RUD→	A condition has developed causing the yaw servo to provide a sustained force. Ensure the slip/skid indicator is centered and observe any maximum fuel imbalance limits.
Preflight Test	PFT	Performing preflight system test. Upon completion, the aural alert will be heard.
	PFT	Preflight system test has failed.

System Status Field

Figure A-5 AFCS System Status Field

TAWS ALERTS

Annunciations appear on the PFD and MFD. Pop-up alerts appear only on the MFD.

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Pop-Up Alert	Aural Message
Excessive Descent Rate Warning (EDR)	PULL UP	PULL-UP	"Pull Up"
Reduced Required Terrain Clearance Warning (RTC)	PULL UP	TERRAIN - PULL-UP or TERRAIN AHEAD - PULL-UP	"Terrain, Terrain; Pull Up, Pull Up" or "Terrain Ahead, Pull Up; Terrain Ahead, Pull Up"
Imminent Terrain Impact Warning (ITI)	PULL UP	TERRAIN AHEAD - PULL-UP or TERRAIN - PULL-UP	Terrain Ahead, Pull Up; Terrain Ahead, Pull Up" or "Terrain, Terrain; Pull Up, Pull Up"
Reduced Required Obstacle Clearance Warning (ROC)	PULL UP	OBSTACLE - PULL-UP or OBSTACLE AHEAD - PULL-UP	"Obstacle, Obstacle; Pull Up, Pull Up" or "Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up"
Imminent Obstacle Impact Warning (IOI)	PULL UP	OBSTACLE AHEAD - PULL-UP or OBSTACLE - PULL-UP	"Obstacle Ahead, Pull Up; Obstacle Ahead, Pull Up" or "Obstacle, Obstacle; Pull Up, Pull Up"
Reduced Required Terrain Clearance Caution (RTC)	TERRAIN	CAUTION - TERRAIN or TERRAIN AHEAD	"Caution, Terrain; Caution, Terrain" or "Terrain Ahead; Terrain Ahead"
Imminent Terrain Impact Caution (ITI)	TERRAIN	TERRAIN AHEAD or CAUTION - TERRAIN	"Terrain Ahead; Terrain Ahead" or "Caution, Terrain; Caution, Terrain"
Reduced Required Obstacle Clearance Caution (ROC)	TERRAIN	CAUTION - OBSTACLE or OBSTACLE AHEAD	"Caution, Obstacle; Caution, Obstacle" or "Obstacle Ahead; Obstacle Ahead"
Imminent Obstacle Impact Caution (IOI)	TERRAIN	OBSTACLE AHEAD or CAUTION - OBSTACLE	"Obstacle Ahead; Obstacle Ahead" or "Caution, Obstacle; Caution, Obstacle"
Premature Descent Alert Caution (PDA)	TERRAIN	TOO LOW - TERRAIN	"Too Low, Terrain"
Altitude Callout "500"	None	None	"Five-Hundred"
Excessive Descent Rate Caution (EDR)	TERRAIN	SINK RATE	"Sink Rate"
Negative Climb Rate Caution (NCR)	TERRAIN	DON'T SINK or TOO LOW - TERRAIN	"Don't Sink" or "Too Low, Terrain"

TAWS SYSTEM STATUS ANNUNCIATIONS

Alert Type	PFD/MFD TAWS Page Annunciation	MFD Pop-Up Alert	Aural Message
TAWS System Test Fail	TAWS FAIL	None	"TAWS System Failure"
TAWS Alerting is disabled	TAWS INHB	None	None
No GPS position or excessively degraded GPS signal	TAWS N/A	None	"TAWS Not Available" "TAWS Availble" will be heard when sufficient GPS signal is re-established.
System Test in progress	TAWS TEST	None	None
System Test pass	None	None	"TAWS System Test OK"

TRAFFIC VOICE ALERTS

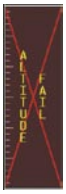
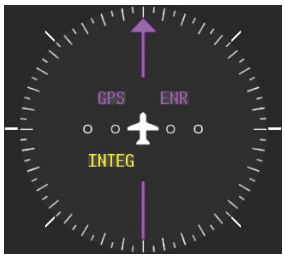
Voice Alert	Alert Trigger
"Traffic"	Played when a Traffic Advisory (TA) is issued.
"Traffic Not Available"	Played when the traffic system fails or cannot communicate.
"Traffic, Traffic"	Played when a Traffic Advisory (TA) is issued (Skywatch TAS system).
"Traffic Advisory System Test Passed"	Played when the TAS system passes a pilot-initiated self test.
"Traffic Advisory System Test Failed"	Played when the TAS system fails a pilot-initiated self test.

G1000 SYSTEM ANNUNCIATIONS

When an LRU or an LRU function fails, a large red 'X' is typically displayed on windows associated with the failed data. The following section describes various system annunciations. Refer to the POH for additional information regarding pilot responses to these annunciations.

NOTE: *Upon power-up of the G1000 system, certain windows remain invalid as G1000 equipment begins to initialize. All windows should be operational within one minute of power-up. Should any window continue to remain flagged, the G1000 system should be serviced by a Garmin-authorized repair facility.*

System Annunciation	Comment
	Attitude and Heading Reference System is aligning.
	Display system is not receiving attitude information from the AHRS.
	Display system is not receiving airspeed input from air data computer.
	Display is not receiving altitude input from the air data computer.
	Display is not receiving vertical speed input from the air data computer.
	Display is not receiving valid heading input from AHRS.

	Display is not receiving altitude input from the air data computer.
	Display is not receiving vertical speed input from the air data computer.
	Display is not receiving valid heading input from AHRS.
	GPS information is either not present or is invalid for navigation use. Note that AHRS utilizes GPS inputs during normal operation. AHRS operation may be degraded if GPS signals are not present (see POH).
	Display is not receiving valid transponder information.
Other Various Red X Indications	A red 'X' through any other display field, such as engine instrumentation fields, indicates that the field is not receiving valid data.

A red 'X' may be the result of an LRU or an LRU function failure. The Figure 12-6 illustrates all possible flags and the responsible LRUs.

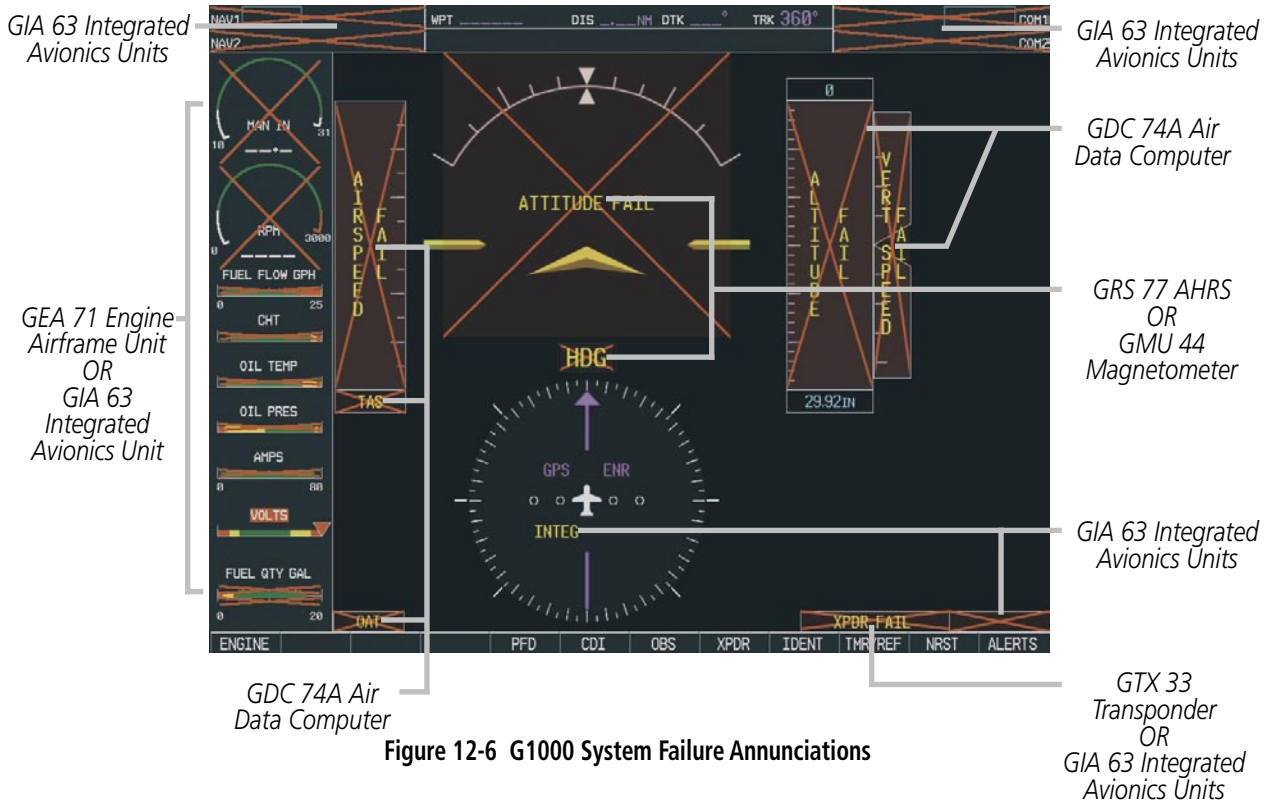


Figure 12-6 G1000 System Failure Annunciations

G1000 SYSTEM ALERT MESSAGES

This section describes various G1000 system alert messages. Certain messages are issued due to an LRU or an LRU function failure. Such messages are displayed in the Alerts Window and are normally accompanied by a corresponding red 'X' annunciation as shown previously in the G1000 System Annunciation section.

NOTE: *This section provides information regarding G1000 alert messages that may be displayed by the system. Knowledge of the aircraft, systems, flight conditions, and other existing operational priorities must be considered when responding to a message. Always use sound pilot judgment. The Beechcraft A36/G36 Pilot's Operating Handbook (POH) takes precedence over any conflicting guidance found in this section.*

MFD & PFD Message Advisories

Message	Comments
DATA LOST – Pilot stored data was lost. Recheck settings.	The pilot profile data was lost. System reverts to default pilot profile and settings. The pilot may reconfigure the MFD & PFD with preferred settings, if desired.
XTALK ERROR – A flight display crosstalk error has occurred.	The MFD and PFD are not communicating with each other. The G1000 system should be serviced.
PFD1 SERVICE – PFD1 needs service. Return unit for repair.	The PFD and/or MFD self-test has detected a problem. The G1000 system should be serviced.
MFD1 SERVICE – MFD1 needs service. Return unit for repair.	
PFD1 CONFIG – PFD1 configuration error. Config service req'd.	The PFD and/or MFD configuration settings do not match backup configuration memory. The G1000 system should be serviced.
MFD1 CONFIG – MFD1 configuration error. Config service req'd.	
SW MISMATCH – GDU software mismatch. Xtalk is off.	The MFD and PFD have different software versions installed. The G1000 system should be serviced.
MANIFEST – PFD1 software mismatch. Communication halted.	The PFD and/or MFD has incorrect software installed. The G1000 system should be serviced.
MANIFEST – MFD1 software mismatch. Communication halted.	
PFD1 COOLING – PFD1 has poor cooling. Reducing power usage.	The PFD and/or MFD is overheating and is reducing power consumption by dimming the display. If problem persists, the G1000 system should be serviced.
MFD1 COOLING – MFD1 has poor cooling. Reducing power usage.	
PFD1 "KEY" KEYSTK – Key is stuck.	A key is stuck on the PFD and/or MFD bezel. Attempt to free the stuck key by pressing it several times. The G1000 system should be serviced if the problem persists.
MFD1 "KEY" KEYSTK – Key is stuck.	
CNFG MODULE – PFD1 configuration module is inoperative.	The PFD configuration module backup memory has failed. The G1000 system should be serviced.
PFD1 VOLTAGE – PFD1 has low voltage. Reducing power usage.	The PFD1 voltage is low. The G1000 system should be serviced.
MFD1 VOLTAGE – MFD1 has low voltage. Reducing power usage.	The MFD1 voltage is low. The G1000 system should be serviced.

Database Message Advisories

Alerts Window Message	Comments
MFD1 DB ERR – MFD1 aviation database error exists.	The MFD and/or PFD detected a failure in the aviation database. Attempt to reload the aviation database. If problem persists, the G1000 system should be serviced.
PFD1 DB ERR – PFD1 aviation database error exists.	
MFD1 DB ERR – MFD1 basemap database error exists.	The MFD and/or PFD detected a failure in the basemap database.
PFD1 DB ERR – PFD1 basemap database error exists.	
MFD1 DB ERR – MFD1 terrain database error exists.	The MFD and/or PFD detected a failure in the terrain database. Ensure that the terrain card is properly inserted in display. Replace terrain card. If problem persists, the G1000 system should be serviced.
PFD1 DB ERR – PFD1 terrain database error exists.	
MFD1 DB ERR – MFD1 obstacle database error exists.	The MFD and/or PFD detected a failure in the obstacle database. Ensure that the data card is properly inserted. Replace data card. If problem persists, the G1000 system should be serviced.
PFD1 DB ERR – PFD1 obstacle database error exists.	
MFD1 DB ERR – MFD1 airport terrain database error exists.	The MFD and/or PFD detected a failure in the airport terrain database. Ensure that the data card is properly inserted. Replace data card. If problem persists, the G1000 system should be serviced.
PFD1 DB ERR – PFD1 airport terrain database error exists.	
DB MISMATCH – Aviation database version mismatch. Xtalk is off.	The PFD and MFD have different aviation database versions installed. Crossfill is off. Install correct aviation database version in both displays.
DB MISMATCH – Aviation database type mismatch. Xtalk is off.	The PFD and MFD have different aviation database types installed (Americas, European, etc.). Crossfill is off. Install correct aviation database type in both displays.
DB MISMATCH – Basemap database version mismatch. Xtalk is off.	The PFD and MFD have different basemap database versions installed. Crossfill is off. Install correct basemap database version in both displays.
DB MISMATCH – Terrain database version mismatch. Xtalk is off.	The PFD and MFD have different terrain database versions installed. Crossfill is off. Install correct terrain database version in both displays.
DB MISMATCH – Terrain database type mismatch. Xtalk is off.	The PFD and MFD have different terrain database types installed. Crossfill is off. Install correct terrain database type in both displays.
DB MISMATCH – Obstacle database version mismatch. Xtalk is off	The PFD and MFD have different obstacle database versions installed. Crossfill is off. Install correct obstacle database version in both displays.

GMA 1347 Message Advisories

Alerts Window Message	Comments
GMA1 FAIL – GMA1 is inoperative.	The audio panel self-test has detected a failure. The audio panel is unavailable. The G1000 system should be serviced.
GMA1 CONFIG – GMA1 configuration error. Config service req'd.	The audio panel configuration settings do not match backup configuration memory. The G1000 system should be serviced.
MANIFEST – GMA1 software mismatch. Communication halted.	The audio panel has incorrect software installed. The G1000 system should be serviced.
GMA1 SERVICE – GMA1 needs service. Return unit for repair.	The audio panel self-test has detected a problem in the unit. Certain audio functions may still be available, and the audio panel may still be usable. The G1000 system should be serviced when possible.
BACKUP PATH – Audio panel 1 using backup data path.	The #1 audio panel is using a backup communication path. The G1000 system should be serviced when possible.

GIA 63 Message Advisories

Alerts Window Message	Comments
GIA1 CONFIG – GIA1 configuration error. Config service req'd.	The GIA1 and/or GIA2 configuration settings do not match backup configuration memory. The G1000 system should be serviced.
GIA2 CONFIG – GIA2 configuration error. Config service req'd.	
GIA1 COOLING – GIA1 temperature too low.	The GIA1 and/or GIA2 temperature is too low to operate correctly. Allow units to warm up to operating temperature.
GIA2 COOLING – GIA2 temperature too low.	
GIA1 COOLING – GIA1 over temperature.	The GIA1 and/or GIA2 temperature is too high. If problem persists, the G1000 system should be serviced.
GIA2 COOLING – GIA2 over temperature.	

GIA 63 Message Advisories (Cont.)

Alerts Window Message	Comments
GIA1 SERVICE – GIA1 needs service. Return the unit for repair.	The GIA1 and/or GIA2 self-test has detected a problem in the unit. The G1000 system should be serviced.
GIA2 SERVICE – GIA2 needs service. Return the unit for repair.	
HW MISMATCH – GIA hardware mismatch. Communication halted.	There is a hardware mismatch between GIA1 and GIA2. The G1000 system should be serviced.
MANIFEST – GIA1 software mismatch. Communication halted.	The GIA1 and/or GIA 2 has incorrect software installed. The G1000 system should be serviced.
MANIFEST – GIA2 software mismatch. Communication halted.	
COM1 TEMP – COM1 over temp. Reducing transmitter power.	The system has detected an over temperature condition in COM1 and/or COM2. The transmitter will operate at reduced power. If the problem persists, the G1000 system should be serviced.
COM2 TEMP – COM2 over temp. Reducing transmitter power.	
COM1 SERVICE – COM1 needs service. Return unit for repair.	The system has detected a failure in COM1 and/or COM2. COM1 and/or COM2 may still be usable. The G1000 system should be serviced when possible.
COM2 SERVICE – COM2 needs service. Return unit for repair.	
COM1 PTT – COM1 push-to-talk key is stuck.	The COM1 and/or COM2 external push-to-talk switch is stuck in the enable (or "pressed") position. Press the PTT switch again to cycle its operation. If the problem persists, the G1000 system should be serviced.
COM2 PTT – COM2 push-to-talk key is stuck.	
COM1 RMT XFR – COM1 remote transfer key is stuck.	The COM1 and/or COM2 transfer switch is stuck in the enabled (or "pressed") position. Press the transfer switch again to cycle its operation. If the problem persists, the G1000 system should be serviced.
COM2 RMT XFR – COM2 remote transfer key is stuck.	
RAIM UNAVAIL – RAIM is not available from FAF to MAP waypoints.	GPS satellite coverage is insufficient to perform Receiver Autonomous Integrity Monitoring (RAIM) from the FAF to the MAP waypoints.
RAIM UNAVAIL – RAIM is not available.	GPS satellite coverage is insufficient to perform Receiver Autonomous Integrity Monitoring (RAIM) for the current phase of flight.
POSN ERROR – RAIM has determined GPS position is in error.	When a RAIM position error is detected, GPS is flagged and the system no longer provides GPS-based guidance.

GIA 63 Message Advisories (Cont.)

Alerts Window Message	Comments
DGRD GPS ACC – GPS position accuracy degraded & RAIM unavailable.	GPS position accuracy has been degraded and RAIM is not available.
GPS1 FAIL – GPS1 is inoperative.	A failure has been detected in the GPS1 and/or GPS2 receiver. The receiver is unavailable. The G1000 system should be serviced.
GPS2 FAIL – GPS2 is inoperative.	
GPS1 SERVICE – GPS1 needs service. Return unit for repair.	A failure has been detected in the GPS1 and/or GPS2 receiver. The receiver may still be available. The G1000 system should be serviced.
GPS2 SERVICE – GPS2 needs service. Return unit for repair.	
NAV1 SERVICE – NAV1 needs service. Return unit for repair.	A failure has been detected in the NAV1 and/or NAV2 receiver. The receiver may still be available. The G1000 system should be serviced.
NAV2 SERVICE – NAV2 needs service. Return unit for repair.	
NAV1 RMT XFR – NAV1 remote transfer key is stuck.	The remote NAV1 and/or NAV2 transfer switch is stuck in the enabled (or "pressed") state. Press the transfer switch again to cycle its operation. If the problem persists, the G1000 system should be serviced.
NAV2 RMT XFR – NAV2 remote transfer key is stuck.	
G/S1 FAIL – G/S1 is inoperative.	A failure has been detected in glideslope receiver 1 and/or receiver 2. The G1000 system should be serviced.
G/S2 FAIL – G/S2 is inoperative.	
G/S1 SERVICE – G/S1 needs service. Return unit for repair.	A failure has been detected in glideslope receiver 1 and/or receiver 2. The receiver may still be available. The G1000 system should be serviced when possible.
G/S2 SERVICE – G/S2 needs service. Return unit for repair.	

GEA 71 Message Advisories

Alerts Window Message	Comments
GEA1 CONFIG – GEA1 configuration error. Config service req'd.	The GEA 71 configuration settings do not match those of backup configuration memory. The G1000 system should be serviced.
MANIFEST – GEA1 software mismatch. Communication halted.	The GEA 71 has incorrect software installed. The G1000 system should be serviced.
BACKUP PATH – EIS using backup data path.	The GEA 71 is using a backup communication path. The G1000 system should be serviced when possible.

GTX 33 Message Advisories

Alerts Window Message	Comments
XPDR1 CONFIG – XPDR1 config error. Config service req'd.	The transponder configuration settings do not match those of backup configuration memory. The G1000 system should be serviced.
MANIFEST – GTX1 software mismatch. Communication halted.	The transponder has incorrect software installed. The G1000 system should be serviced.
BACKUP PATH – XPDR1 using backup data path.	The #1 transponder is using a backup communications path. The G1000 system should be serviced when possible.

GRS 77 Message Advisories

Alerts Window Message	Comments
AHRS1 TAS – AHRS1 not receiving airspeed.	The #1 AHRS is not receiving true airspeed from the air data computer. The AHRS relies on GPS information to augment the lack of airspeed. The G1000 system should be serviced.
AHRS1 GPS – AHRS1 using backup GPS source.	The #1 AHRS is using the backup GPS path. Primary GPS path has failed. The G1000 system should be serviced when possible.
AHRS1 GPS – AHRS1 not receiving any GPS information.	The #1 AHRS is not receiving any or any useful GPS information. Check AFMS limitations. The G1000 system should be serviced.
AHRS1 GPS – AHRS1 not receiving backup GPS information.	The #1 AHRS is not receiving backup GPS information. The G1000 system should be serviced.
AHRS1 GPS – AHRS1 operating exclusively in no-GPS mode.	The #1 AHRS is operating exclusively in no-GPS mode. The G1000 system should be serviced.
MANIFEST – GRS1 software mismatch. Communication halted.	The AHRS has incorrect software installed. The G1000 system should be serviced.
BACKUP PATH – AHRS1 using backup data path.	The #1 AHRS is using a backup communications data path. The G1000 system should be serviced when possible.
AHRS1 SRVC – AHRS1 Magnetic-field model needs update.	The #1 AHRS earth magnetic field model is out of date. Update magnetic field model when practical.
GEO LIMITS – AHRS1 too far North/South, no magnetic compass.	The aircraft is outside geographical limits for approved AHRS operation. Heading is flagged as invalid.

GMU 44 Message Advisories

Alerts Window Message	Comments
HDG FAULT – AHRS1 magnetometer fault has occurred.	A fault has occurred in the GMU 44. Heading is flagged as invalid. The AHRS uses GPS for backup mode operation. The G1000 system should be serviced.
MANIFEST – GMU1 software mismatch. Communication halted.	The GMU 44 has incorrect software installed. The G1000 system should be serviced.

GDL 69 Message Advisories

Alerts Window Message	Comments
GDL69 CONFIG – GDL 69 configuration error. Config service req'd.	GDL 69 configuration settings do not match those of backup configuration memory. The G1000 system should be serviced.
GDL69 FAIL – GDL 69 has failed.	A failure has been detected in the GDL 69. The receiver is unavailable. The G1000 system should be serviced

GDC 74A Message Advisories

Alerts Window Message	Comments
GDC1 CONFIG – GDC1 configuration error. Config service req'd.	GDC 74A configuration settings do not match those of backup configuration memory. The G1000 system should be serviced.
MANIFEST – GDC1 software mismatch. Communication halted.	The GDC 74A has incorrect software installed. The G1000 system should be serviced.
BACKUP PATH – ADC1 using backup data path.	The GDC 74A is using a backup communications data path. The G1000 system should be serviced when possible.

Miscellaneous Message Advisories

Alerts Window Message	Comments
FPL WPT LOCK – Flight plan waypoint is locked.	Upon power-up, the G1000 system detects that a stored flight plan waypoint is locked. This occurs when an aviation database update eliminates an obsolete waypoint. The flight plan cannot find the specified waypoint and flags this message. This can also occur with user waypoints in a flight plan that is deleted. Remove the waypoint from the flight plan if it no longer exists in any database, OR update the waypoint name/identifier to reflect the new information.
FPL WPT MOVE – Flight plan waypoint moved.	The system has detected that a waypoint coordinate has changed due to a new aviation database update. Verify that stored flight plans contain correct waypoint locations.
TIMER EXPIRD – Timer has expired.	The system notifies the pilot that the timer has expired.
DB CHANGE – Database changed. Verify user modified procedures.	This occurs when a stored flight plan contains procedures that have been manually edited. This alert is issued only after an aviation database update. Verify that the user-modified procedures in stored flight plans are correct and up to date.
FPL TRUNC – Flight plan has been truncated.	This occurs when a newly installed aviation database eliminates an obsolete approach or arrival used by a stored flight plan. The obsolete procedure is removed from the flight plan. Update flight plan with current arrival or approach.
APPR VPROF – Approaching VNAV profile.	Aircraft is approaching VNAV profile. Prepare to climb or descend to meet VNAV profile.
APPR TRG ALT – Approaching target altitude.	Aircraft is approaching target altitude. Prepare to level aircraft.
LOCKED FPL – Cannot navigate locked flight plan.	This occurs when the pilot attempts to activate a stored flight plan that contains locked waypoint. Remove locked waypoint from flight plan. Update flight plan with current waypoint.
WPT ARRIVAL – Arriving at waypoint -[xxxx]	Arriving at waypoint [xxxx], where [xxxx] is the waypoint name.
STEEP TURN – Steep turn ahead.	A steep turn is 15 seconds ahead. Prepare to turn.
INSIDE ARSPC – Inside airspace.	The aircraft is inside the airspace.
ARSPC AHEAD – Airspace ahead less than 10 minutes.	Special use airspace is ahead of aircraft. The aircraft will penetrate the airspace within 10 minutes.

Miscellaneous Message Advisories (Cont.)

Alerts Window Message	Comments
ARSPC NEAR – Airspace near and ahead.	Special use airspace is near and ahead of the aircraft position.
ARSPC NEAR – Airspace near – less than 2 nm.	Special use airspace is within 2 nm of the aircraft position.
LEG UNSMOOTH – Flight plan leg will not be smooth.	The approaching flight plan waypoints are too close to allow for smooth turns. Prepare for steep turns ahead and expect noticeable course deviations.
APPR INACTV – Approach is not active.	The system notifies the pilot that the loaded approach is not active. Activate approach when required.
SLCT AUTOSEQ – Select auto sequence mode.	The system notifies the pilot to select auto-sequence mode. Press the OBS Softkey to deactivate the OBS mode.
SLCT FREQ – Select appropriate frequency for approach.	The system notifies the pilot to load the approach frequency for the appropriate NAV receiver. Select the correct frequency for the approach.
SLCT NAV – Select NAV on CDI for approach.	The system notifies the pilot to set the CDI to the correct NAV receiver. Set the CDI to the correct NAV receiver.
NO WGS84 WPT – Non WGS 84 waypoint for navigation -[xxxx]	The selected waypoint [xxxx] does not use the WGS 84 datum. Cross-check position with alternate navigation sources.
TRAFFIC FAIL – Traffic device has failed.	The G1000 is no longer receiving data from the traffic system. The traffic device should be serviced.
STRMSCP FAIL – Stormscope has failed.	Stormscope has failed. The G1000 system should be serviced.
BACKUP PATH – Stormscope using backup path.	Stormscope is using the backup communication path. The G1000 system should be serviced when possible.

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SD CARD USE

The G1000 System uses Secure Digital (SD) cards to load and store various types of data. For basic flight operations, SD cards are required for terrain database storage as well as aviation database updates.

AVIATION DATABASE

Jeppesen aviation databases are released every 28 days, and are provided directly to the pilot by Jeppesen. Updates must be loaded to both the MFD and PFD using an aviation database update SD card provided by Jeppesen. The card reader downloads the aviation database files and stores them in the PFD and MFD internal memory.

***NOTE:** The display downloads the aviation database and stores it internally. The aviation database SD card is not required to remain in the display after the update.*

Updating the Jeppesen aviation database:

1) With the G1000 System OFF, insert the aviation database update SD card into the top card slot of the PFD (Label of SD card facing left).

2) Turn the G1000 System ON. This prompt is displayed on the upper left corner of the PFD:

```
DO YOU WANT TO UPDATE THE AVIATION DATABASE?
PRESS CLR FOR NO AND ENT FOR YES
YOU HAVE 30 SECONDS BEFORE NO IS RETURNED
```

3) Press the **ENT** Key to confirm the database updated. This prompt is displayed:

```
DO YOU WANT TO UPDATE THE AVIATION DATABASE?
PRESS CLR FOR NO AND ENT FOR YES
YOU HAVE 30 SECONDS BEFORE NO IS RETURNED
UPDATING AVIATION DATABASE
.
UPDATED 1 FILES SUCCESSFULLY!
```

4) After the update completes, the PFD starts in normal mode. Remove the aviation database update SD card from the PFD.

5) Turn the G1000 System OFF.

6) Repeat steps 1 through 4 for the MFD. The MFD and PFD aviation databases are now updated.

7) Verify that the correct update cycle is loaded during startup of the MFD.

TERRAIN AND OBSTACLE DATABASES

NOTE: *The data contained in the terrain and obstacle databases comes from government agencies. Garmin accurately processes and cross-validates the data, but cannot guarantee the accuracy and completeness of the data.*

NOTE: *Obstacles 200' and higher are included in the obstacle database. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database.*

G1000 topography, terrain, and obstacle data is stored on a Supplemental Data Card provided by Garmin. The obstacle database update cycle is every 56 days. The terrain database is updated less often, and on an irregular basis. Since these databases are not stored internally in the MFD or PFD, Supplemental Data Cards containing identical database versions must be kept in both displays to retain terrain and obstacle data. A Supplemental Data Card should be inserted into the bottom card slot of the PFD and MFD.

NOTE: *If the Supplemental Data Card is removed from the display, the* ***TOPO*** *and* ***TERRAIN*** *softkeys are not functional and are grayed out on the MFD Map Page.*

The obstacle and terrain database updates can be obtained by following the instructions detailing in the 'Aviation Databases' section of the Garmin website (www.garmin.com). Once the updated files have been downloaded from the website, a PC equipped with an appropriate SD card reader is used to unpack and program the new databases onto the existing Supplemental Data Cards. Equipment required to perform the update is as follows:

- Windows-compatible PC computer (Windows 2000 or XP recommended).
- SanDisk SD Card Reader, P/Ns SDDR-93 or SDDR-99 or equivalent card reader.
- Updated database obtained from the Garmin website.
- Existing 010-00330-41 Supplemental Database SD Cards from both PFD and MFD.

After the data has been copied to both data cards, perform the following steps:

1) Insert one card in the bottom card slot of the MFD and one in the bottom card slot of the PFD.
2) Apply power to the G1000 System. View the MFD power-up splash screen. Check that the Terrain and Obstacle databases are initialized and displayed on the scrolling window of the splash screen.
3) Acknowledge the Power-up Page agreement by pressing the **ENT** Key or the right most softkey.
4) At the MAP – NAVIGATION MAP page, select the **MAP** Softkey and check to make sure that the **TOPO** and **TERRAIN** softkeys are functional (not grayed out).
5) Power down the G1000.

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Land and water data is provided only as a general reference to your surroundings.
HW Terrain Database
Version 2.00
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Terrain data is provided only as an aid to situational awareness.
US Obstacle Database
Version 2.00
Copyright 2003

Figure B-1 Power-Up Splash Screen Window

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GLOSSARY

ACC	accuracy
ACT	active
ADC	air data computer
ADF	Automatic Direction Finder
ADI	Attitude Direction Indicator
AF	Arc to fix
AFCS	Automatic Flight Control System
AFM	Aircraft Flight Manual
AFMS	Aircraft Flight Manual Supplement
AFRM	airframe
AGL	Above Ground Level
AHRS	Attitude and Heading Reference System
AIM	Airman's Information Manual
AIRMET	Airman's Meteorological Information
ALT	altitude
ALT, ALTN	alternator
AMPS	amperes
ANNUNC	annunciation
ANT	antenna
AP	autopilot
AP DISC	autopilot disconnect
APPR, APR	approach
APT	airport
ARINC	Aeronautical Radio Incorporated
ARSPC	airspace
ARTCC	Air Route Traffic Control Center
ARV	arrival
AS	airspeed
ASB	Aviation Support Branch
ATC	Air Traffic Control
ATCRBS	ATC Radar Beacon System
AUTOSEQ	automatic sequence
AUX	auxiliary
B ALT	barometric altitude
BARO	barometer
BATT	battery
BC	backcourse
Bearing	The compass direction from the present position to a destination waypoint.
BFO	beat frequency oscillator
BKSP	backspace
BRG	bearing
C	Celsius
CA	Course to Altitude
CALC	calculator
Calibrated Airspeed	Indicated airspeed corrected for installation and instrument errors.
CD	Course to DME distance
CDI	Course Deviation Indicator
CDU	Control Display Unit
CF	Course to Fix
CHT	Cylinder Head Temperature
CHKLIST	checklist
CHNL	channel
CI	Course to Intercept
CLD	cloud
CLR	clear
cm	centimeter
CNS	Communication, Navigation, & Surveillance
CO	carbon monoxide
COM	communication radio
CONFIG	configuration
COOL	coolant
COPLT	copilot
Course	The line between two points to be followed by the aircraft.
Course to Steer	The recommended direction to steer in order to reduce course error or stay on course. Provides the most efficient heading to get back to the desired course and proceed along the flight plan.
CR	Course to Radial
CRG	Cockpit Reference Guide
CRNT	current
Crosstrack Error	The distance the aircraft is off a desired course in either direction, left or right.
CRS	course
CRS	Course to Steer
CRSR	cursor
CTRL	control
Cumulative	The total of all legs in a flight plan.
CVR	Cockpit Voice Recorder
CVRG	coverage
CWS	control wheel steering
CYL	cylinder
D ALT	density altitude
DB, DBASE	database
dBZ	decibels 'Z' (Radar Return)
DCLTR, DECLTR	declutter
DEC FUEL	decrease fuel
deg	degree
DEIC, DEICE	de-icing

DEP	departure
Desired Track	The desired course between the active "from" and "to" waypoints.
DF	Direct to Fix
DFLT	default
DGRD	degrade
Dilution of Precision	A measure of GPS satellite geometry quality on a scale of one to ten (lower numbers equal better geometry, where higher numbers equal poorer geometry)
DIS	distance
Distance	The 'great circle' distance from the present position to a destination waypoint.
DME	Distance Measuring Equipment
DOP	Dilution of Precision
DP	Departure Procedure
DSBL	disabled
DTK	Desired Track
E	empty
EASA	European Aviation Safety Agency
ECU	Engine Control Unit
Efficiency	A measure of fuel consumption, expressed in distance per unit of fuel.
EGT	Exhaust Gas Temperature
EIS	Engine Indication System
ELEV	elevation
ELEV	elevator
EMERGCY	emergency
EMI	Electromagnetic Interference
ENDUR	endurance
Endurance	Flight endurance, or total possible flight time based on available fuel on board.
ENG	engine
ENGD	engaged
ENR	enroute
Enroute Safe Altitude	The recommended minimum altitude within ten miles left or right of the desired course on an active flight plan or direct-to.
ENT	enter
EPE	Estimated Position Error
ERR	error
ESA	Enroute Safe Altitude
Estimated Position Error	A measure of horizontal GPS position error derived by satellite geometry conditions and other factors.
Estimated Time of Arrival	The estimated time at which the aircraft should reach the destination waypoint, based upon current speed and track.
Estimated Time Enroute	The estimated time it takes to reach the destination waypoint from the present position, based upon current groundspeed.
ETA	Estimated Time of Arrival
ETE	Estimated Time Enroute
EXPIRD	expired
FA	Course From Fix to Altitude
FAA	Federal Aviation Administration
FADEC	Full Authority Digital Engine Control
FAF	Final Approach Fix
FAIL	failure
FC	Course From Fix to Distance
FCC	Federal Communication Commission
FCST	forecast
FD	Course From Fix to DME Distance
FD	flight director
FDE	Fault Detection and Exclusion
FFLOW	fuel flow
FIS-B	Flight Information Services-Broadcast
FISDL	Flight Information Service Data Link
FLC	Flight Level Change
FM	Course From Fix to Manual Termination
FMS	Flight Management System
FOB	Fuel On Board
FPL	flight plan
fpm	feet per minute
FREQ	frequency
FRZ	freezing
FSS	Flight Service Station
ft	foot/feet
Fuel Flow	The fuel flow rate, expressed in units of fuel per hour.
Fuel On Board	The total amount of usable fuel on board the aircraft.
G/S, GS	glideslope
GA	go-around
gal, gl	gallon(s)
GBOX	gearbox
GDC	Garmin Air Data Computer
GDL	Garmin Satellite Data Link
GDU	Garmin Display Unit
GEA	Garmin Engine/Airframe Unit
GEO	geographic
GFC	Garmin Flight Control
GIA	Garmin Integrated Avionics Unit
GMA	Garmin Audio Panel System
GMT	Greenwich Mean Time

GMU	Garmin Magnetometer Unit
GND	ground
gph	gallons per hour
GPS	Global Positioning System
Grid MORA	Grid Minimum Off-Route Altitude; one degree latitude by one degree longitude in size and clears the highest elevation reference point in the grid by 1000 feet for all areas of the grid
Groundspeed	The velocity that the aircraft is travelling relative to a ground position.
Ground Track	*see Track*
GRS	Garmin Reference System
GS	Ground speed
GTX	Garmin Transponder
HA	Hold Terminating at Altitude
HDG	heading
Heading	The direction an aircraft is pointed, based upon indications from a magnetic compass or a properly set directional gyro.
HF	Hold Terminating at Fix
HFOM	Horizontal Figure of Merit
Hg	mercury
HI	high
HI SENS	High Sensitivity
HM	Hold with Manual Termination
hPa	hectopascal
Horizontal Figure of Merit	A measure of the uncertainty in the aircraft's horizontal position.
hr	hour
HSDB	High-Speed Data Bus
HSI	Horizontal Situation Indicator
HT	heat
HUL	Horizontal Uncertainty Level
Hz	Hertz
I	Inner Marker
IAF	Initial Approach Fix
IAT	Indicated Air Temperature
IAU	Integrated Avionics Unit
ICAO	International Civil Aviation Organization
ICS	Intercom System
ID	Identification/Morse Code Identifier
IDENT, IDNT	identification
IF	Initial Fix
IFR	Instrument Flight Rules
IG	Imperial gallon
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
in	inch
INACTV	inactive
INC FUEL	increase fuel
IND	indicated
Indicated	Information provided by properly calibrated and set instrumentation on the aircraft panel.
INFO	information
in HG	inches of mercury
INT	intersection(s)
INTEG	integrity (RAIM unavailable)
IrDA, IRDA	Infrared Data Association
KEYSTK	key stuck
kg	kilogram
kHz	kilohertz
km	kilometer
kt	knot
L	left
LAT	latitude
LBL	label
lb	pound
LCD	Liquid Crystal Display
LCL	local
LED	Light Emitting Diode
Left Over Fuel On Board	The amount of fuel remaining on board after the completion of one or more legs of a flight plan or direct-to.
Left Over Fuel Reserve	The amount of flight time remaining, based on the amount of fuel on board after the completion of one or more legs of a flight plan or direct-to, and a known consumption rate.
Leg	The portion of a flight plan between two waypoints.
LIFR	Low Instrument Flight Rules
LO	low
LOC	localizer
LON	longitude
LRU	Line Replacement Unit
LTNG	lightning
LVL	level
M	Middle Marker
MAG VAR	Magnetic Variation
MAHP	Missed Approach Hold Point
MAN IN	manifold pressure (inches Hg)
MAN SQ	Manual Squelch

MAP	Missed Approach Point
MASQ	Master Avionics Squelch
MAX	maximum
MAXSPD	maximum speed (overspeed)
MDA	barometric minimum descent height
MET	manual electric trim
METAR	Meteorological Aviation Routine
MEPT	manual electric pitch trim
MFD	Multi Function Display
MGRS	Military Grid Reference System
MHz	megahertz
MIC	microphone
MIN	minimum
Minimum Safe Altitude	Uses Grid MORAs to determine a safe altitude within ten miles of the aircraft present position.
MKR	marker beacon
MOA	Military Operations Area
MOV	movement
mpm	meters per minute
MSA	Minimum Safe Altitude
MSL	Mean Sea Level
m	meter
mV	millivolt(s)
MVFR	Marginal Visual Flight Rules
\NAV	navigation
NAVAID	NAVigation AID
NDB	Non-directional Beacon
NEXRAD	Next Generation Radar
nm	nautical mile(s)
NRST	nearest
O	Outer Marker
OAT	Outside Air Temperature
OBS	Omni Bearing Selector
OXY	oxygen
P ALT	pressure altitude
PA	Passenger Address
PA	Proximity Advisory
PASS	passenger(s)
PC	personal computer
PFD	Primary Flight Display
PI	Procedure Turn to Course Intercept
PIT, PTCH	pitch
POH	Pilot's Operating Handbook
POHS	Pilot's Operating Handbook Supplement
POSN	position
PPM	parts per million
P. POS	Present Position
PRES, PRESS	pressure
PROC	procedure(s)
psi	pounds per square inch
PT	Procedure Turn
PTT	Push-to-Talk
PWR	power
QTY	quantity
R	right
RAD	radial
RAIM	Receiver Autonomous Integrity Monitoring
RAM	random access memory
REF	reference
REM	remaining (fuel remaining above Reserve)
REQ	required
RES, RSV	reserve (fuel reserve entered by pilot)
RF	Constant Radius Turn to Fix
RMI	Radio Magnetic Indicator
RMT	remote
RNG	range
RNWY	runway
ROL	roll
ROM	read only memory
rpm	revolutions per minute
RST FUEL	reset fuel
RVRSNRY	reversionary
RX	receive
SA	Selective Availability
SAT	Static Air Temperature
SCIT	Storm Cell Identification and Tracking
SD	Secure Digital
sec	second(s)
SEL, SLCT	select
SFC	surface
SIAP	Standard Instrument Approach Procedures
SID	Standard Instrument Departure
SIGMET	Significant Meteorological Information
Sim	simulator
SLP/SKD	slip/skid
SMBL	symbol
SPD	speed
SPI	Special Position Identification
SPKR	speaker
SQ	squelch
SRVC, SVC	service
STAL	stall

STAR	Standard Terminal Arrival Route
STATS	statistics
STBY	standby
STD	standard
STRMSCP	Stormscope
SUA	Special Use Airspace
SUSP	suspend
SW	software
SYS	system
TA	Traffic Advisory
TACAN	Tactical Air Navigation System
TAF	Terminal Aerodrome Forecast
TAS	True Airspeed
TAS	Traffic Advisory System
TAT	Total Air Temperature
TAWS	Terrain Awareness and Warning System
TCA	Terminal Control Area
TCAS	Traffic Collision Avoidance System
TEL	telephone
TEMP	temperature
TERM	terminal
TF	Track Between Two Fixes
TFR	Temporary Flight Restriction
T HDG	True Heading
TIS	Traffic Information System
TIT	Turbine Inlet Temperature
TKE	Track Angle Error
TMA	Terminal Maneuvering Area
TMR/REF	Timer/Reference
Topo	topographic
Track	Direction of aircraft movement relative to a ground position; also 'Ground Track'
Track Angle Error	The angle difference between the desired track and the current track.
TRG	target
TRK	track
TRUNC	truncated
TTL	total
TX	transmit
UNAVAIL	unavailable
USR	user
UTC	Coordinated Universal Time
UTM/UPS	Universal Transverse Mercator / Universal Polar Stereographic Grid
V, Vspeed	velocity (airspeed)
V_{LE}	maximum landing gear extended speed
V_{LO}	maximum landing gear operating speed
V_{MC}	minimum control speed
V_{MO} (M_{MO})	maximum speed
V_{NE}	never-exceed speed
V_R	rotate speed
V_X	best angle of climb speed
V_Y	best rate of climb speed
V_{YSE}	best single-engine rate of climb speed
VA	Heading Vector to Altitude
VAPP	VOR approach
VD	Heading Vector to DME Distance
Vdc	volts, direct current
VERT	vertical
Vertical Figure of Merit	A measure of the uncertainty in the aircraft's vertical position.
Vertical Speed Required	The vertical speed necessary to descend/climb from a current position and altitude to a defined target position and altitude, based upon current groundspeed.
VFOM	Vertical Figure of Merit
VFR	Visual Flight Rules
VHF	Very High Frequency
VI	Heading Vector to Intercept
VLOC	VOR/Localizer Receiver
VM	Heading Vector to Manual Termination
VMC	Visual Meteorological Conditions
VNAV	vertical navigation
VOL	volume
VOR	VHF Omnidirectional Range
VORTAC	very high frequency omnidirectional range station and tactical air navigation
VPROF	VNAV profile, vertical profile
VR	Heading Vector to Radial
VS	vertical speed
VSI	Vertical Speed Indicator
VSR	Vertical Speed Required
W	watt(s)
WAAS	Wide Area Augmentation System
WARN	warning (GPS position error)
WGS-84	World Geodetic System - 1984
WPT	waypoint(s)
WW	world wide
WX	weather
XFER, XFR	transfer
XPDR	transponder
XTALK	cross-talk
XTK	cross-track

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FREQUENTLY ASKED QUESTIONS

If a particular aspect of G1000 operational capability is not addressed by these commonly asked questions or in the index, contact Garmin (see the copyright page or back cover for contact information) or a Garmin-authorized dealer. Garmin is dedicated to supporting its products and customers.

WHAT IS RAIM AND HOW DOES IT AFFECT APPROACH OPERATIONS?

RAIM is an acronym for Receiver Autonomous Integrity Monitoring. RAIM is a GPS receiver function that performs the following functions:

- Monitors and verifies integrity and geometry of tracked GPS satellites
- Eliminates a corrupt satellite from the navigation solution
- Notifies the pilot when satellite conditions do not provide the necessary coverage to support a certain phase of flight
- Predicts satellite coverage of a destination area to determine whether the number of available satellites is sufficient to satisfy requirements

***NOTE:** If RAIM is not predicted to be available for the final approach course, the approach does not become active, as indicated by the "RAIM not available from FAF to MAP" message and the INTEG annunciation flagging on the HSI.*

For RAIM to work correctly, the GPS receiver must track at least five satellites. A minimum of six satellites is required to allow RAIM to eliminate a single corrupt satellite from the navigation solution.

RAIM ensures that satellite geometry allows for a navigation solution calculation within a specified protection limit (2.0 nm for oceanic and enroute, 1.0 nm for terminal, and 0.3 nm for non-precision approaches). The G1000 System monitors RAIM and issues an alert message when RAIM is not available (see Appendix A). Without RAIM, GPS position accuracy cannot be monitored. If RAIM is not available when crossing the FAF, the pilot must fly the missed approach procedure.

WHY ARE THERE NOT ANY APPROACHES AVAILABLE FOR A FLIGHT PLAN?

Approaches are available for the final destination airport in a flight plan or as a direct-to (keep in mind that some VOR/VORTAC identifiers are similar to airport identifiers). If a destination airport does not have a published approach, the G1000 indicates "NONE" for the available procedures.

WHAT HAPPENS WHEN AN APPROACH IS SELECTED? CAN A FLIGHT PLAN WITH AN APPROACH, A DEPARTURE, OR AN ARRIVAL BE STORED?

When an approach, departure, or arrival is loaded into the active flight plan, a set of approach, departure, or arrival waypoints is inserted into the flight plan, along with a header line showing the title of the selected instrument procedure. The original enroute portion of the flight plan remains active, unless the instrument procedure is activated. This may be done either when the procedure is loaded or at a later time.

Flight plans can also be stored with an approach, a departure, or an arrival. Note that the active flight plan is erased when the system is turned off. Also, the active flight plan is overwritten when another flight plan is activated. When storing flight plans with an approach, a departure, or an arrival, the G1000 uses the waypoint information from the current database to define the waypoints. If the database is changed or updated, the G1000 System automatically updates the information, provided the procedure has not been modified. Should an approach, departure, or arrival procedure no longer be available, the flight plan becomes locked until the procedure is deleted from the flight plan.

Can "slant Golf" ("/G") be filed using the G1000?

"/G" may be filed for a flight plan. The G1000 System meets the requirements of TSO-C129 Class A1 or A2 installation. Non-precision GPS approaches are not to be flown with an expired database. See the approved Aircraft Flight Manual Supplement (AFMS) as well as the Aeronautical Information Manual (AIM) for more information.

What does the OBS Softkey do?

The **OBS** Softkey is used to select manual sequencing of waypoints. Activating OBS mode sets the current active-to waypoint as the primary navigation reference and prevents the system from sequencing to the next waypoint in a flight plan. When OBS mode is cancelled, automatic waypoint sequencing is continued, and the G1000 automatically activates the next waypoint in the flight plan once the aircraft has crossed the present active waypoint.

Normal (OBS not activated)	OBS
• Automatic sequencing of waypoints	• Manual sequencing - 'holds' on selected waypoint
• Manual course change on HSI not possible	• Manually select course to waypoint from HSI
• Always navigates 'TO' the active waypoint	• Indicates 'TO' or 'FROM' waypoint
• Must be in this mode for final approach course	• Cannot be set for final approach course or published holding patterns

When OBS mode is active, the G1000 allows the pilot to set a desired course to/from a waypoint using the **CRS/BARO** Knob and HSI (much like a VOR).

One application for the **OBS** Softkey is holding patterns. The **OBS** Softkey is used to suspend waypoint sequencing and select the desired course along the waypoint side of the hold. For many approach operations, setting and resetting of waypoint sequencing is automatic. Holding patterns that are part of an approach automatically disable waypoint sequencing, then re-enable waypoint sequencing after one time around the holding pattern. To fly the holding pattern a second time, select the **OBS** Softkey. An example of this operation is an approach which begins with a holding pattern at the initial approach fix (IAF).

WARNING: *The G1000 does not provide guidance to the missed approach hold point (MAHP). Always follow published missed approach procedures when flying a missed approach.*

The most common application for using the **OBS** Softkey is the missed approach. The G1000 suspends automatic waypoint sequencing (indicated by a "SUSP" annunciation placed on the HSI) when the missed approach point (MAP) is crossed. This prevents the G1000 from automatically sequencing to the missed approach holding point (MAHP). During this time, the **OBS** Softkey designation changes to **SUSP**. Pressing the **SUSP** Softkey reactivates automatic waypoint sequencing. The **OBS** Softkey then resumes its normal functionality.

Why does the G1000 not automatically sequence to the next waypoint?

The G1000 only sequences flight plan waypoints when automatic sequencing is enabled (i.e., no "OBS" or "SUSP" annunciation). For automatic sequencing to occur, the aircraft must also cross the "bisector" of the turn being navigated. The bisector is a line passing through the waypoint common to two flight plan legs at an equal angle from each leg.

How can a waypoint be skipped in an approach, a departure, or an arrival?

The G1000 allows the pilot to manually select any approach, departure, or arrival leg as the active leg of the flight plan. This procedure is performed on the MFD from the Active Flight Plan Page by highlighting the desired waypoint and selecting the **ACT LEG** Softkey then the **ENT** Key to approve the selection. The GPS then provides navigation along the selected flight plan leg.

When does turn anticipation begin?

The G1000 smooths adjacent leg transitions based on a normal 15° bank angle (with the ability to roll up to 25°) and provides three pilot cues for turn anticipation:

- A waypoint alert ("NEXT DTK ###°") flashes on the PFD 10 seconds before the turn point
- A flashing turn advisory ("TURN TO ###°") appears on the PFD when the pilot is to begin the turn and the HSI (GPS mode) automatically sequences to the next DTK value
- The To/From indicator on the HSI flips momentarily to indicate that the midpoint of the turn has been crossed

When does the CDI scale change?

When 30 nm from the destination, the G1000 begins a smooth CDI scale transition from 5.0 nm (enroute mode) to 1.0 nm (terminal mode). When 2 nm from the FAF during an active approach, the CDI scale transitions to 0.3 nm (approach mode). When executing a missed approach, the CDI can be returned to the 1.0 nm scale by selecting the **SUSP** Softkey. The CDI is also set to 1.0 nm (terminal mode) within 30 nm of the departure airport.

Why does the HSI not respond like a VOR when OBS mode is active?

Unlike a VOR, the CDI scale used on GPS equipment is based on the crosstrack distance to the desired course, not on the angular relationship to the destination. Therefore, the CDI deflection on the GPS is constant regardless of the distance to the destination and does not become less sensitive when further away from the destination.

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G1000 MAP DATUMS

WARNING: *WGS 84 is the default datum and should be used in all situations except when another datum is specifically required for safe navigation. Pilots using map datums other than WGS 84 do so at their own risk.*

The G1000 System supports the following map datums:

What is the correct missed approach procedure? How is the missed approach holding point selected?

To comply with TSO specifications, the G1000 does not automatically sequence past the MAP. The first waypoint in the missed approach procedure becomes the active waypoint when the **SUSP** Softkey is selected *after* crossing the MAP. All published missed approach procedures must be followed, as indicated on the approach plate.

To execute the missed approach procedure prior to the MAP (not recommended), select the Active Flight Plan Page and use the **ACT LEG** Softkey to activate the missed approach portion of the procedure.

After a missed approach, how can the same approach be re-selected? How can a new approach be activated?

NOTE: *Do not attempt to reactivate the current approach prior to crossing the missed approach point (MAP). If an attempt to do so is made, an alert message "Are you sure you want to discontinue the current approach?" appears. The G1000 directs the pilot back to the transition waypoint and does not take into consideration any missed approach procedures, if the current approach is reactivated.*

After flying the missed approach procedure, the pilot may reactivate the same approach for another attempt from the Procedures Window (opened by pressing the **PROC** Key). Once the clearance is given for another attempt, activate the approach from the Procedures Window by highlighting "Activate Approach?" using the large **FMS** Knob and pressing the **ENT** Key. The G1000 provides navigation along the desired course to the waypoint and rejoins the approach in sequence from that point.

To activate a new approach for the same airport, select the new procedure from the Procedures Window. Choose "Select Approach?", select the desired approach from the list shown, and press the **ENT** Key. Select the desired transition, then activate the approach using the **ENT** Key.

To activate a new approach to a different airport, press the **Direct-to** Key and select the desired airport using the **FMS** Knob. Press the **ENT** Key to accept the selected airport, then follow the steps in the preceding paragraph to select an approach for the new airport.

ADINDAN	Ethiopia, Mali, Senegal, Sudan
AFGOOYE	Somalia
AIN El ABD 1970	Bahrain Island, Saudi Arabia
ANNA 1 ASTRO 1965	Cocos Islands
ARC 1950	Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe
ARC 1960	Kenya, Tanzania
ASCENSION IS 1958	Ascension Island
ASTRO B4 SOROL ATOLL	Tern Island
ASTRO BEACON "E"	Iwo Jima Island
ASTRO DOS 71/4	St. Helena Island
ASTRONOMIC STN 1952	Marcus Island
AUSTRALIAN GEOD 1966	Australia, Tasmania Island
AUSTRALIAN GEOD 1984	Australia, Tasmania Island
AUSTRIA NS	Austria
BELGIUM 1950	Belgium
BELLEVUE (IGN)	Efate and Erromango Islands
BERMUDA 1957	Bermuda Islands
BOGATA OBSERVATORY	Colombia
BUKIT RIMPAH	Indonesia
CAMP AREA ASTRO	Antarctica
CAMPO INCHAUSPE	Argentina
CANTON ASTRO 1966	Phoenix Islands
CAPE	South Africa
CAPE CANAVERAL	Florida, Bahama Islands
CARTHAGE	Tunisia
CH-1903	Switzerland
CHATHAM 1971	Chatham Island (New Zealand)
CHUA ASTRO	Paraguay
CORREGO ALEGRE	Brazil
DANISH GI 1934	Denmark
DJAKARTA (BATAVIA)	Sumatra Island (Indonesia)
DOS 1968	Gizo Island (New Georgia Islands)
EASTER ISLAND 1967	Easter Island
EUROPEAN 1950	Austria, Belgium, Denmark, Finland, France, Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland
EUROPEAN 1979	Austria, Finland, Netherlands, Norway, Spain, Sweden, Switzerland
FINLAND HAYFORD 1910	Finland
G. SEGARA	Borneo
GANDAJIKA BASE	Republic of Maldives
GEODETIC DATUM 1949	New Zealand
GGRS 87	Greece
GUAM 1963	Guam Island
GUX 1 ASTRO	Guadalcanal Island
HERAT NORTH	Afghanistan
HJORSEY 1955	Iceland
HONG KONG 1963	Hong Kong
HU-TZU SHAN	Taiwan
INDIAN BNGLDSH NEPAL	Bangladesh, India, Nepal
INDIAN MEAN VALUE	India
INDIAN THAILAND VIETN	Thailand, Vietnam
INDONESIA 74	Indonesia
IRELAND 1965	Ireland
ISTS 073 ASTRO 1969	Diego Garcia
JOHNSTON ISLAND 1961	Johnston Island
KANDAWALA	Sri Lanka
KERGUELEN ISLAND	Kerguelen Island
KERTAU 1948	West Malaysia
L.C. 5 ASTRO	Cayman Brac Island
LIBERIA 1964	Liberia
LUZON MEAN VALUE	Philippines
LUZON MINDANAO IS	Mindanao Island
LUZON PHILIPPINES	Philippines (excluding Mindanao Island)
MAHE 1971	Mahe Island
MARCO ASTRO	Salvage Islands
MASSAWA	Eritrea (Ethiopia)
MERCHICH	Morocco
MIDWAY ASTRO 1961	Midway Island
MINNA	Nigeria
NAD27 ALASKA	North American 1927 – Alaska
NAD27 BAHAMAS	North American 1927 – Bahamas
NAD27 CANADA	North American 1927 – Canada
NAD27 CANAL ZONE	North American 1927 – Canal Zone
NAD27 CARIBBEAN	North American 1927 – Caribbean: Barbados, Caicos Islands, Cuba, Dominican Republic, Cayman Islands, Jamaica, Leeward and Turks Islands
NAD27 CENTRAL AMERICA	North American 1927 – Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua
NAD27 CONUS	North American 1927 – Continental United States
NAD27 CUBA	North American 1927 – Cuba
NAD27 GREENLAND	North American 1927 – Greenland (Hayes Peninsula)
NAD27 MEXICO	North American 1927 – Mexico
NAD27 SAN SALVADOR IS	North American 1927 – San Salvador Island
NAD83	North American 1983 – Alaska, Canada, Central America, CONUS, Mexico
NAHRWAN MASIRAH IS	Masirah Island (Oman)
NAHRWAN SAUDI ARABIA	Saudi Arabia
NAHRWAN UNITD ARAB E	United Arab Emirates
NAPARIMA BWI	Trinidad and Tobago
NETHERLAND TRIAG '21	Netherlands
NOU TRIAG FRANCE	France

NOU TRIAG LUXEMBOURG	Luxembourg
OBSERVATORIO 1966	Corvo and Flores Islands (Azores)
OLD EGYPTIAN	Egypt
OLD HAWAIIAN KAUAI	Kauai
OLD HAWAIIAN MAUI	Maui
OLD HAWAIIAN MEAN	Mean Value
OLD HAWAIIAN OAHU	Oahu
OMAN	Oman
ORD SRV GRT BRITAIN	England, Isle of Man, Scotland, Shetland Islands, Wales
PICO DE LAS NIEVAS	Canary Islands
PITCAIRN ASTRO 1967	Pitcairn Island
PORTUGUESE 1973	Portugal
POTSDAM	Germany
PROV SO AMERICA '56	Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, Venezuela
PROV SO CHILEAN 1963	South Chile
PUERTO RICO	Puerto Rico and Virgin Islands
QATAR NATIONAL	Qatar
QORNOQ	South Greenland
REUNION	Mascarene Island
ROME 1940	Sardinia Island
RT 90	Sweden
SANTO (DOS)	Espirito Santo Island
SAO BRAZ	Sao Miguel, Santa Maria Islands (Azores)
SAPPER HILL 1943	East Falkland Island
SCHWARZECK	Namibia
SOUTH AMERICAN 1969	Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela
SOUTH ASIAN	Singapore
SOUTHEAST BASE	Porto Santo and Madeira Islands
SOUTHWEST BASE	Faial, Graciosa, Pico, Sao Jorge and Terceira Islands
TANANARIVE OBSV 1925	Madagascar
TIMBALAI 1948	Brunei and East Malaysia (Sarawak and Sabah)
TOKYO	Japan, Korea, Okinawa
TRISTAN ASTRO 1968	Tristan da Cunha
VITI LEVU 1916	Viti Levu Island, Fiji Islands
WAKE-ENIWETOK 1960	Marshal Islands
WGS 72	World Geodetic System 1972
WGS 84	World Geodetic System 1984
YACARE	Uruguay
ZANDERIJ	Surinam

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GENERAL TIS INFORMATION

INTRODUCTION

NOTE: *Aircraft without an operating transponder are invisible to TIS.*

The Traffic Information Service (TIS) provides traffic advisory information to non-TAS/TCAS-equipped aircraft. TIS is a ground-based service providing the relative locations of all ATCRBS Mode-A and Mode-C transponder equipped aircraft within a specified service volume. The TIS ground sensor uses real-time track reports to generate traffic notification. The G1000 System displays TIS traffic information on the Traffic Map Page of the MFD. TIS information may also be displayed for overlay on the MFD Navigation Map Page, as well as on the PFD Inset Map. Surveillance data includes all transponder-equipped aircraft within the coverage volume. The G1000 System displays up to eight traffic targets within a 7.5-nm radius, from 3,000 feet below, to 3,500 feet above the requesting aircraft.

TIS VS. TAS/TCAS

The main difference between the Traffic Information System (TIS) and Traffic Advisory (TAS) or Traffic Collision Avoidance Systems (TCAS) is the source of surveillance data. TAS/TCAS uses an airborne interrogator with a half-second update rate, while TIS utilizes the terminal Mode-S ground interrogator and accompanying data link to provide a five-second update rate. TIS and TAS/TCAS have similar ranges.

TIS LIMITATIONS

NOTE: *TIS is not intended to be used as a collision avoidance system and does not relieve the pilot of the responsibility to "see and avoid" other aircraft. TIS shall not be used for avoidance maneuvers during instrument meterorlogical conditions (IMC) or when there is no visual contact with the intruder aircraft.*

NOTE: *Refer to the TIS Limitations section of the Aeronautical Information Manual (AIM) for a more comprehensive explanation.*

TIS relies on surveillance of the Mode-S radar system, which is a "secondary surveillance" radar system similar to that used by ATCRBS. Many limitations are inherent in secondary radar surveillance. Information provided by TIS is neither better nor more accurate than the information used by ATC. TIS is intended only to assist in visual acquisition of other aircraft in visual meteorological conditions (VMC). While TIS is a useful aid for visual traffic avoidance, system limitations must be considered to ensure proper use. No recommended avoidance maneuvers are given, nor authorized, as a direct result of a TIS intruder display or TIS advisory.

- TIS operation may be intermittent during turns or other maneuvering.
- TIS is dependent on two-way, line-of-sight communications between the aircraft and the Mode-S radar antenna. Whenever the structure of the aircraft comes between the transponder antenna and the ground-based radar antenna, the signal may be temporarily interrupted.
- Other limitations and anomalies associated with TIS are described in the AIM.

WARNING: *Garmin is not responsible for Mode S geographical coverage. Operation of the ground stations is the responsibility of the FAA. Refer to the AIM for a Terminal Mode S radar site map.*

NOTE: *TIS is unavailable at low altitudes in many areas of the United States. This is often the case in mountainous regions.*

TIS information is collected during a single radar sweep. Collected information is then sent through the Mode S uplink on the next radar sweep. Because of this, the surveillance information is approximately five seconds old. TIS ground station tracking software uses prediction algorithms to compensate for this delay. These algorithms use track history data to calculate expected intruder positions consistent with the time of display. Occasionally, aircraft maneuvering may cause variations in this calculation and create slight errors on the Traffic Map Page. Errors affect relative bearing information and target track vector. This can cause a delay in the displayed intruder information. However, intruder distance and altitude typically remain relatively accurate and may be used to assist in spotting traffic.

The following errors are common examples:

- When the client or intruder aircraft maneuvers excessively or abruptly, the tracking algorithm may report incorrect horizontal position until the maneuvering aircraft stabilizes.
- When a rapidly closing intruder is on a course that intercepts the client aircraft course at a shallow angle (either overtaking or head-on) and either aircraft abruptly changes course within 0.25 nm, TIS may display the intruder aircraft on the incorrect side of the client aircraft.

These are rare occurrences and are typically resolved within a few radar sweeps once the client/intruder aircraft course stabilizes.

Pilots using TIS can provide valuable assistance in the correction of malfunctions by reporting observations of undesirable performance. Reports should identify the time of observation, location, type and identity of the aircraft, and describe the condition observed. Reports should also include the type of transponder and transponder software version. Since TIS performance is monitored by maintenance personnel, not ATC, malfunctions should be reported in the following ways:

- By telephone to the nearest Flight Service Station (FSS) facility
- By FAA Form 8000-7, Safety Improvement Report (postage-paid card can be obtained at FAA FSSs, General Aviation District Offices, Flight Standards District Offices, and General Aviation Fixed Base Operators)

MAP SYMBOLS

AIRPORT

Item	Symbol
Unknown Airport	
Non-towered, Non-serviced Airport	
Towered, Non-serviced Airport	
Non-towered, Serviced Airport	
Towered, Serviced Airport	
Restricted (Private) Airport	
Heliport	

BASEMAP

Item	Symbol
Interstate Highway	
State Highway	
US Highway	
National Highway	
Small City or Town	
Medium City	
Large City	

NAVAIDS

Item	Symbol
Intersection	
LOM (Compass Locator at Outer Marker)	
NDB (Non-directional Radio Beacon)	
VOR	
VOR/DME	
VOR/ILS	
VORTAC	
TACAN	

TRAFFIC

Item	Symbol
Non-Threat Traffic	
Proximity Advisory	
Traffic Advisory, Out of Range	
Traffic Advisory	

AIRPORT

Item	Symbol
Unknown Airport	
Non-towered, Non-serviced Airport	
Towered, Non-serviced Airport	
Non-towered, Serviced Airport	
Towered, Serviced Airport	
Restricted (Private) Airport	
Heliport	

NAVAIDS

Item	Symbol
Intersection	
LOM (Compass Locator at Outer Marker)	
NDB (Non-directional Radio Beacon)	
VOR	
VOR/DME	
VOR/ILS	
VORTAC	
TACAN	

BASEMAP

Item	Symbol
Interstate Highway	
State Highway	
US Highway	
National Highway	
Small City or Town	
Medium City	
Large City	

TRAFFIC

Item	Symbol
Non-Threat Traffic	
Proximity Advisory	
Traffic Advisory, Out of Range	
Traffic Advisory	

LINE SYMBOLS

Item	Symbol
ICAO Control Area Class B Airspace	
Mode C Tower Area	
Warning Area Alert Area Caution Area Danger Area Prohibited Area Restricted Area Training Area Unknown Area	
Class C Terminal Radar Service Area Mode C Area	
Military Operations Area (MOA)	
State or Province Border	
International Border	
Road	
Railroad	
Latitude/Longitude	

MISCELLANEOUS

Item	Symbol
ARTCC Frequency or FSS Frequency	
Map Pointer	
Elevation Pointer	
Measuring Pointer	
Overzoom Indicator	

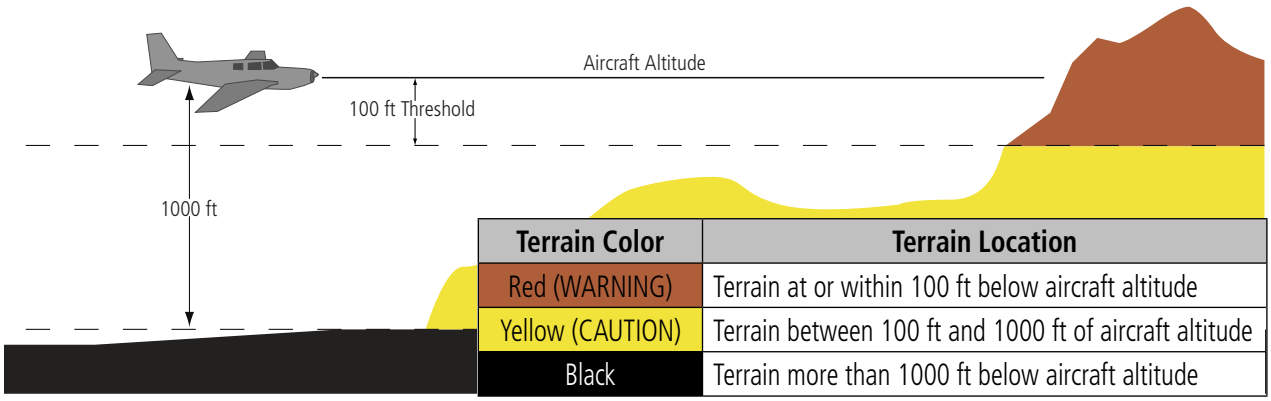
Item	Symbol
Terrain Proximity Enabled	
Traffic Enabled	
User Waypoint	
Wind Vector	

OBSTACLE DATABASE COLORS AND SYMBOLS

Obstacle Symbol	Unlighted Obstacle		Lighted Obstacle		Obstacle Color	Obstacle Location
	< 1000 ft AGL	> 1000 ft AGL	< 1000 ft AGL	> 1000 ft AGL		
					Red (WARNING)	Obstacle within 100 ft or above aircraft altitude
					Yellow (CAUTION)	Obstacle within 1000 ft of aircraft altitude
					Gray	Obstacle more than 1000 ft below aircraft altitude

Table G-1 Obstacle Symbols and Colors

TERRAIN PROXIMITY/TAWS COLOR CHART



Terrain Color	Terrain Location
Red (WARNING)	Terrain at or within 100 ft below aircraft altitude
Yellow (CAUTION)	Terrain between 100 ft and 1000 ft of aircraft altitude
Black	Terrain more than 1000 ft below aircraft altitude

Figure G-1 Terrain Colors

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A

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